Serving the CoCo Community for

The RAINBOW 11 YEARS

THE COLOR COMPUTER MONTHLY MAGAZINE

February 1992 Vol. XI No. 7 Canada $4.95 U.S. $3.95

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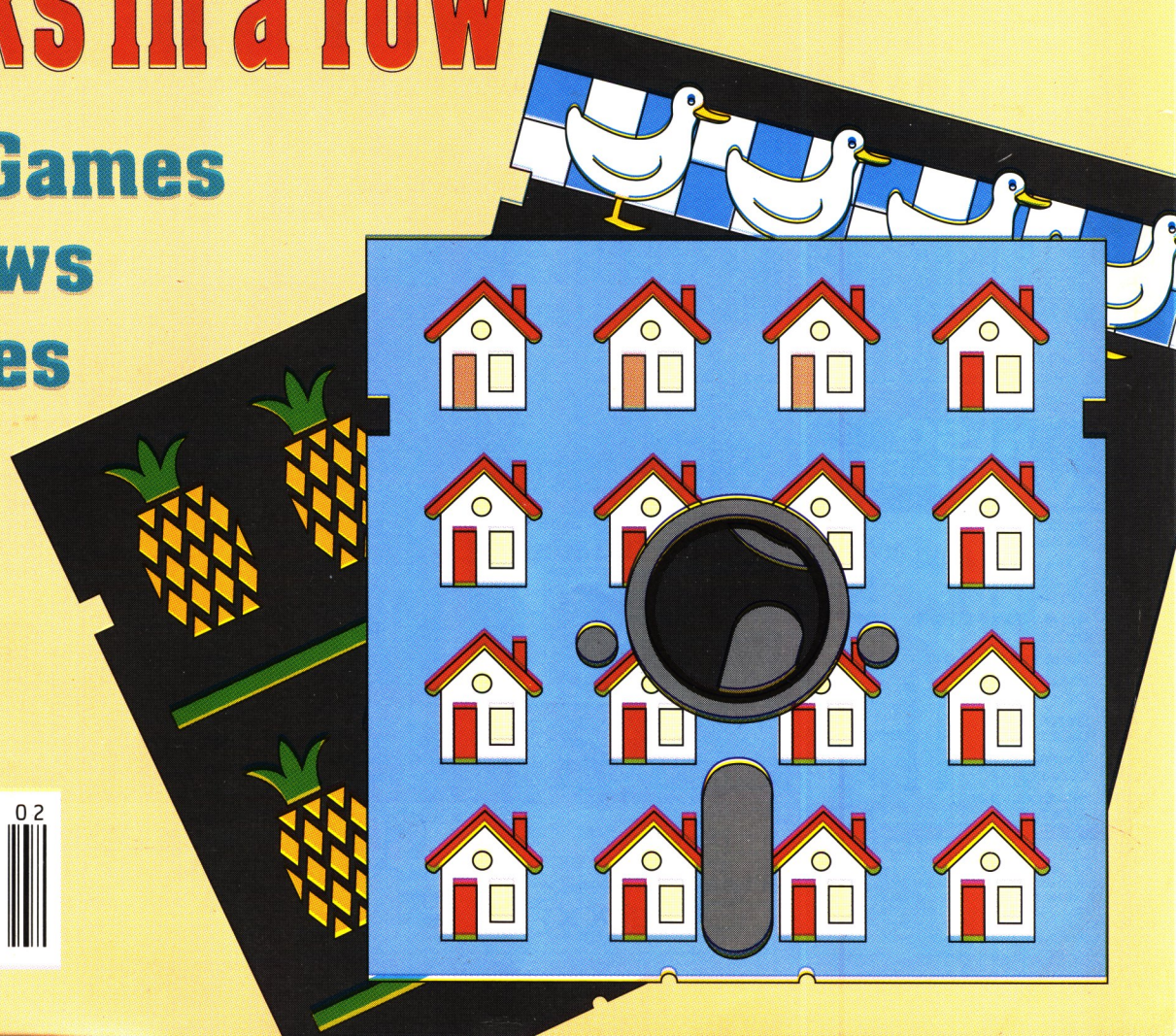
Plus: Games Reviews Puzzles and more



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Energy is everything; your home world depends on it. However, someone or something is slowly siphoning it away. As your world's champion, you must climb into the experimental Power Tank to challenge this nemesis and his minions. Your key lies with the ability to teleport solid mass. Use this to manipulate and explore the endless stronghold of the enemy, and to exploit the free-floating DUPES (Dense Units of Photon Energy) to destroy the menacing Plasma Droids. Be cautious, though; those DUPES can be deadly, too! Photon, a fantastic new arcade game for your Coco3, contains spectacular 320x200 resolution, 16 color graphics, ultra-smooth 60 Hz animation, and loads of real-time music and sound effects. It will send your mind racing over endless possibilities, requiring quick decisions and reactions. Quite simply, Photon is incredibly addictive; it will deliver hours of excitement. Will you become your world's greatest hero, or just another energy slave? Req. 128K CoCo 3 and disk drive.

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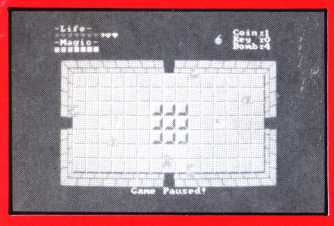

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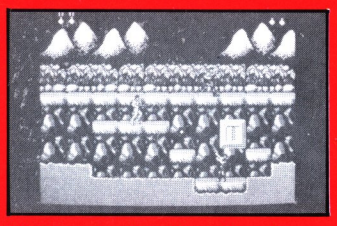

A 512K two player futuristic combat arcade game. Full screen 320x225 hardware scrolling and smooth animation. Back-ground music score and sound effects! 512K Coco3 only. **34.95.** Shipping soon!

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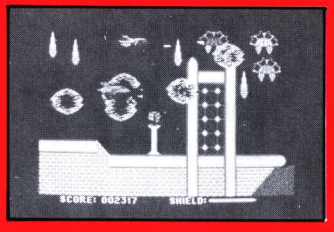

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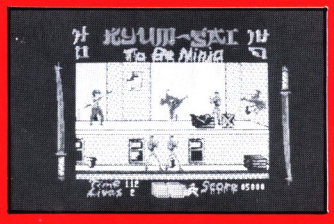

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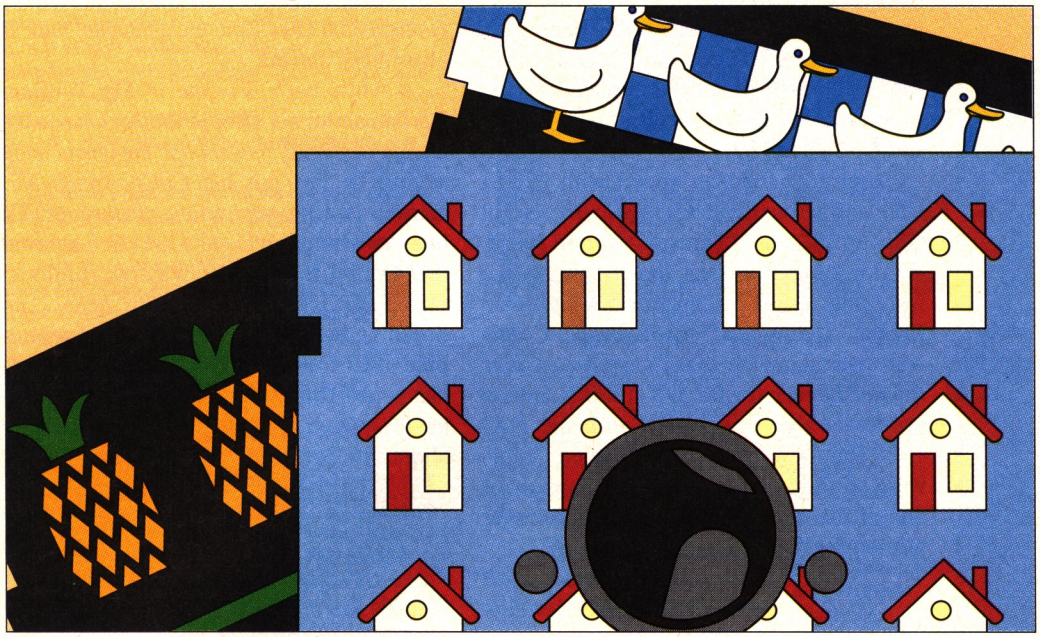

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Letters to the RAINBOW

CoCo Max III and the NX-1020 Rainbow

Editor:

We have received many customer questions and comments regarding the letter from Wayne A. Johnson published in the November 1991 issue. In his letter, Mr. Johnson wrote of an incompatibility between the Star NX-1020 Rainbow printer and *CoCo Max III*.

After Mr. Johnson spoke with Colorware and wrote the letter to you, he sought help from our technical support staff. Working together over the telephone, we were able to get his system "Color CoCo Maxin'" in minutes. He told us that Colorware was unaware that its existing *Color Printer Driver* for the NX-1000 Rainbow printer is also compatible with the NX-1020 Rainbow. We have informed Colorware so they can expand their support of one of the most illustrious programs ever written for the CoCo, *CoCo Max III*.

William R. Hall
President
Dayton Associates, Inc.
9644 Quailwood Trail
Spring Valley, OH 45370

Thanks for the Support

Editor:

This brief note is to express a sincere "Thank You" to you and the dedicated readers of THE RAINBOW. Following your publication of my letter in the November issue, I had several responses from avid CoCo users offering assistance in my attempt to adapt the Star NX-1020 printer for *CoCo Max III*. Responses included letters, phone calls, and samples from those who had working programs. I was overwhelmed by the response. It is proof positive there is a loyal and dedicated elite who are not prepared to abandon the little computer that proved it could! Again, thanks to THE RAINBOW and your considerate readers, the program is now up and running.

Wayne A. Johnson
Route 2
Thamesford, ON N0M 2M0
Canada

New vs. Old

Editor:

As your covers sail to 68K (CPU) oceans far past my 64K (RAM) horizon, I am thrilled to see THE RAINBOW's publisher praising *Telewriter-64*, admitting there has been no real improvement since that classic came out. I'd love to try *Simply Better*'s foreign character font, etc., but Mr. Falk is absolutely correct.

A while back, I wrote to Mr. William Barden about his offer in the June issue for a copy of his *EZ Assembler*. He wrote back saying he has put his CoCo away. Mr. Barden is a pioneer and a researcher. To hear he's hung up his CoCo is like hearing that Daniel Boone put away his flintlock. Computer Island is deserted, Microcom doesn't advertise, and even the kind gentleman at CoCoSoft in House, New Mexico, has gone offline. I'm glad you're still with us; there is so much I still have to discover about my CoCos!

Charles Scanlon
2 Eagle Lane
Simsbury, CT 06070

We all have our preferences regarding word-processors, and some do offer many new and useful features. But we agree; Lonnie's point ("Do you really need a more powerful machine in order to do what you want to do?") is a good one.

Scanners and Double-Sided Drives

Editor:

Radio Shack sells a 4-inch page scanner (Cat. No. 900-2383) with a serial interface. Can I use this device with my CoCo 3, and are there any programs that are compatible with it? I am also looking for a DOS with which I can gain access to the second side of my FD-502 disk drive.

Charles Rempel
P.O. Box 245
Plum Coulee, MB R0G 1R0
Canada

Presently, hand scanners are not supported by the CoCo. However, Chris Burke of Burke & Burke has been doing some work toward using a hand scanner with OS-9. Most of the alternate DOSs that have been developed for the CoCo allow the use of 40-track double-sided drives. OS-9 Level II also supports double-sided drives. The following pokes allow you to use both sides of an FD-502 (double-sided) drive with

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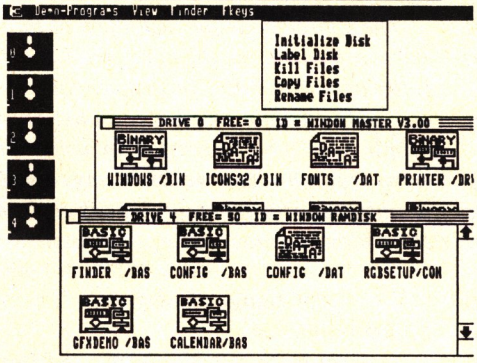

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"..it offers so many features that it is probably underpriced. I recommend this software to all CoCo3 owners." -The Rainbow Feburary 1989

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Disk BASIC on the CoCo 3, assuming you are using a disk-drive cable in which all teeth are used in the drive connectors.

Disk BASIC 2.0:

```
POKE &HD7AC,&H41
POKE &HD7AD,&H42
```

Disk BASIC 2.1:

```
POKE &HD89F,&H41
POKE &HD8A0,&H42
```

SR-1000 and the CoCo

Editor:

I have a CoCo 2 and recently borrowed a Peripheral Sears SR-1000 printer from one of my friends. What pins would I connect from the CoCo to the printer to make it work?

Brian Miranda
4449 N. Larmie Avenue
Chicago, IL 60630

We don't have access to an SR-1000 so we can't determine just what you need to do. If the printer uses a serial interface, you need to make a special serial cable to use it with the CoCo. However, if the printer features a standard Centronix parallel interface, you can use a serial-to-parallel converter to drive it with the CoCo. To locate one, try calling Dayton Associates, Owl-Ware and/or CoCo PRO!

The Three Mugateers, Again

Editor:

My friend was playing with his Color Computer 3 one day and a picture of three guys appeared on the screen. He told me it was a very detailed picture, as if taken with a camera. What caused this to happen?

Gabe Ashe
6151 E. Linda Vista
Apache Junction, AZ 85219

The picture your friend saw was the rage of the CoCo Community when the CoCo 3 was first introduced. The three men in the picture are programmers from Microware who patched and added to the BASIC interpreter for Tandy. For more information about the image of the "CoCo Three," see "Building December's Rainbow" on Page 16 of the December 1986 issue.

RAINBOW ON DISK Extras

Editor:

I have seen many people write to you, explaining that they have no access to Delphi. They have also requested you print some of the patches and advice to which others have easy access. Thank you very much for all the extra files (for "Making the Move", October 1991, Page 10) on the October RAINBOW ON DISK, but why couldn't they have been included in the magazine as well? Putting them on the disk is a step in the right direction, but a listing in the magazine would help a lot more people.

John Coldwell
McInnes Island Lightstation
C/O Bag 3670
Prince Rupert, BC V8J 3R1
Canada

The source code for just a few of those extra programs would more than fill an entire RAINBOW. Based on this, we chose the disk-only medium for two reasons: Some people won't be interested in using the extra programs, and we doubt any readers would forego the other things they get from THE RAINBOW to have these programs listed.

A Change of Scenery

Editor:

I subscribe to THE RAINBOW, and I use and enjoy it immensely — I have every issue ever printed. I am looking for scenery disks for Radio Shack's *Flight Simulator II*. Do you know where I might find them?

Charles Baker
3140 Center Street
Bakersfield, CA 93306

At the October CoCofest in Atlanta, CoCo PRO! had several unused copies of the Japan scenery disks on hand. Give CoCo PRO! a call — you might get lucky.

Shareware Blues

Editor:

I seldom write to any magazine to complain about anything, but I want to share a problem I had. In July 1991 I downloaded from Delphi what I consider to be a useful OS-9 program, *CCTools*. The program was uploaded to the OS-9 Group as shareware from the Micro80 Users Group in Winnipeg, Canada. According to the documentation, for a $15 registration fee the group promised to send a module to "disable the annoying screens" in the program. I sent my registration fee on July 22.

After a more-than-reasonable wait (three months), I wrote a letter to the same address, advising the group that I had not yet received the promised module. I have not received a reply, though my cancelled check did come back. I have not had any luck contacting the group via Delphi or Fidonet, either.

I do not expect THE RAINBOW to do anything about this; I consider it $15 down the tube, not to mention a black-eye for the concept of shareware. During these days of dwindling support for the Color Computer, more and more people are relying on shareware for quality software. Groups like the Micro80 Users Group take away a lot of credibility from those honest folks who deserve all the credit and donations they can get.

As a long-time subscriber to THE RAINBOW, I'm concerned about its smaller size and content. But as long as I have a CoCo, I'll continue to subscribe to the best magazine around. Keep up the great work!

Tom Brakel
12628 S. 30th Street
Omaha, NE 68123

The Quest for Higher Learning

Editor:

I am looking for educational programs (Dorsett, Computer Island, etc.) for my CoCo 2. Do you know of any that are still available? Any help would be appreciated.

Ryan Hecht
717 Brentwood
Auburn, IN 46706

Unfortunately, we know of no companies exclusively marketing educational software for the Color Computer. However, T & D Subscription Software does offer several disks containing Public Domain educational programs. Also you may still find some offerings from Tandy in its Radio Shack stores. CoCo PRO! often re-sells original software packages, and a call might be worth your quarter. And THE RAINBOW will continue to include shorter educational programs.

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type RAI to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type LET to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.

Print#-2

At Home With the CoCo

I was asked the other day to talk about how THE RAINBOW and Falsoft got started. It was a terrific hour and a half, and I think some of the things I said fit right in with our theme this month — "Work At Home."

Few people know these days, but THE RAINBOW was very much a one-person show for almost the first year of its life. In that time, it grew from a four-page newsletter to a hundred or so pages (or would have been had we not begun typesetting it) and all of it was done on a plain Color Computer with pretty limited memory, floppy disk drives and a television set for a monitor.

I say this not only because it is a nifty story, but because I think many times we downgrade the CoCo in our own eyes. The Color Computer you are using today is much more powerful and flexible than the one I had at my disposal back then, yet I was able to build a business from that single box.

This means, of course, that you can do the same thing. And you have the machine to do it sitting right in front of you.

Whether you work at home or have work at home, your CoCo is an excellent partner. It can, indeed, be the "secret" to your success. How come? Because, as the old saying goes, genius is 10 percent inspiration and 90 percent perspiration. All you need is an idea and the willingness to spend a lot of time at it.

There are, my friends, a million schemes out there to help you make money: peddling products door-to-door, holding "sales parties" in your home or office, conducting telephone sales, and even the old standby — "addressing envelopes at home." The trouble is, most of these schemes are something thought up by someone else. And while you can do all right with some of them, few ever achieve major success.

The reason is simply that it is always someone else's idea. Rather than that, try your own idea. Look at your CoCo — what can you do with it? Where is a niche that needs some doing and a bit of firepower to make it happen?

How can you do this? Well, you have to have the idea, but let me give you but one example of what you have available to help you.

If you remember the wonderful magazines of the '30s and '40s (*The Saturday Evening Post*, *Look*, *Life*, *Colliers* and the like), you might wonder (as I have) just how those magazines ever got mailed. They had millions of subscribers and nary a computer. Computers were unknown at the time.

Think of the time and manpower it must have taken just to get labels on all of those magazines. It had to be done, at least partially, by hand. There was technology, but it was slow technology.

Once the computer was invented — the early vacuum-tube machines — things changed drastically. And your Color Computer has a heck of a lot more power than those room-sized giants of the '50s. Imagine it.

In fact, imagine putting your computer to work today doing something no one else is doing. Maybe only a niche in some large market, but one that *you* can fill — because *you* thought of it.

With a powerful ally such as your CoCo, perhaps *your* business at home will outgrow your home altogether. Mine did. So can yours.

* * * * *

I am pleased to announce that THE RAINBOW will have a new look starting with the March 1992 issue. We are excited about the changes we are making — changes that give us more options in providing you with the best information you can have for your Color Computer.

— Lonnie Falk

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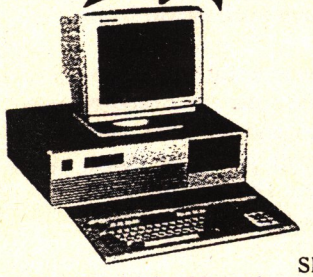

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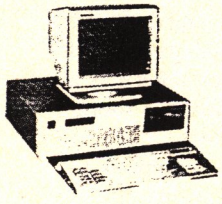

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A framework for many filing jobs

Versabase

by David Polonsky

Arithmetic operations may be the reason computers were originally developed, but storing and retrieving information is where most of the action is. We use word processors for text and spreadsheets for numbers. To handle information that would otherwise be put in a metal file, we use a database.

Versabase provides a foundation from which many different disk-based database applications for the CoCo 3 can be formed. Before going further, however, it must be clear that *Versabase* is *not* a free-form database. Rather it is a framework, in the form of a BASIC program, to which you can add program code to create independent, single-purpose databases. Let's see how this works.

The program shown in Listing 1 is a database for VCR tapes. VCRDATA allows you to enter data for up to 60 tapes in the fields listed in Figure 1, with the indicated field lengths. When you run VCRDATA, you are asked whether you want a 40- or an 80-column screen. Then you see a menu listing the options provided by the *Versabase* skeleton. They are as follows:

Load Data File — When you select this option, you are prompted for a filename. Type the desired name and press ENTER.

Save Data File — Once you have entered new data or modified data in an existing file, use this option to save the file to disk.

Data Entry — Use this option to add data to a file, whether new or previously saved. When you select this option, the screen clears and six data-entry fields appear. To the right of each field is a colored block indicating the suggested length limit for data in that field. As you type, the colored block disappears. When it is gone, you have reached the maximum number of characters you can enter in that field using the Data Entry option.

Enter your data in the appropriate fields, pressing ENTER after each entry. If you press ENTER without entering any data in the first field, *Versabase* returns to the main menu. When you have completed the record, you are asked if you want to enter another. Respond by pressing Y or N. Note: When entering several records at one time, it is wise to return to the main menu and save the file every five records or so. Otherwise an Out of Memory error could crash the program, forcing you to re-enter the data from the beginning.

View/Edit Data — Use this option to see and edit single records in the current database file. You are asked to enter the number of the starting record, which then appears onscreen. At this point, press E to edit the record, N to see the next record, P to see the previous record, M to return to the main menu or W to toggle the width between 40 and 80 columns.

Print Data — When you select this option, you are asked whether you want the data printed to the screen or the printer. If you enter S, a paginated summary of the data in all records is displayed on the screen, one record per line. The Screen option works only in the 80-column mode. Even with this, because of the width limitations, only the first portion of the data fields is shown. However, more than enough is displayed so you can tell what record number holds what item; and care was taken to ensure the important data is completely visible. This is important because the *Versabase* foundation does not support searches.

If you request a printed copy (by entering P at the above prompt), the data for all records is sent to the printer. Each record is printed on its own line, and the entire field contents are printed, based on the filed lengths set up in the BASIC program.

Toggle Width — Select this option to toggle the screen width between 40 and 80 columns.

Quit Program — This option is self-explanatory. You *are* asked if you are sure you want to quit.

Title	30
Star	30
Co-Star	30
Tape Number	5
Date	8
Counter Number	5

Figure 1: VCRDATA Data Fields

The *Versabase* skeleton provides little error-trapping; however, it does work intuitively. For instance, if you have not entered or loaded any records into memory, selecting the Save Data File, View/Edit or Print Data options has no effect.

Versabase in Other Applications

The versatility of the *Versabase* founda-

David Polonsky worked as a special education teacher for 14 years. He is disabled and enjoys working with the Color Computer. Most of his programs were designed to address the needs of his former students. David may be reached at 4 Tudor Court, Apt. 15, Elizabeth, NJ 07208, (908) 352-8931. Please include an SASE when requesting a reply.

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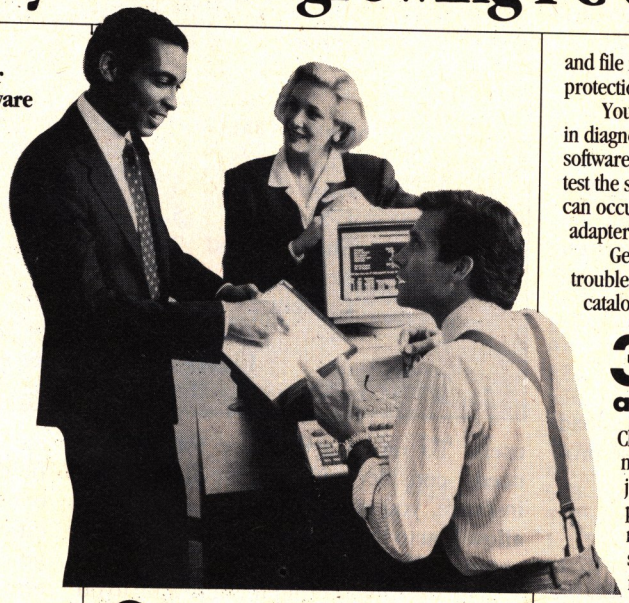

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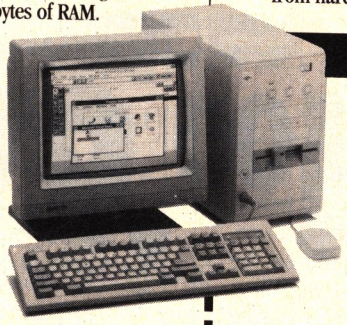

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tion comes from the fact that it is written in BASIC and is easily modified to suit many different filing needs. Take a look at listings 2 through 5. When merged with the VCRDATA program, the programs in these listings create four new filing programs. The *Versabase* portion of VCRDATA remains unchanged, but the program lines controlling the data fields and printing options are modified.

To use one of these "merge" files, first enter and save to disk the program in Listing 1. After checking to be sure VCRDATA works properly, enter NEW, then enter the merge listing as it appears here. When you have finished, save the merge file to disk in ASCII format by entering

```
SAVE "filename.ext",A
```

Once the merge file is saved, load VCRDATA and create the new database program by entering

```
MERGE "filename.ext"
```

Then save the complete database program to disk, using the filename shown in the appropriate listing. That's all there is to it. Using this method and the listings here, you get five complete database programs for storing information about VCR tapes, addresses, compact discs, photograph information and medical prescription records. The field titles and lengths for the last four databases are shown in Figure 2. Otherwise each database works just like VCRDATA, as described above.

As written, the programs require a disk drive. All five database programs are included on this month's RAINBOW ON TAPE and DISK. They are already merged (they are complete and ready-to-run) and are saved in tokenized format. To use them, simply save them on a new formatted disk.

Making Changes

The BASIC code used to create *Versabase* applications is straightforward and should be easily understood by even novice users. To refine a database for specific needs, consider adding more fields. (For instance, you could add fields that would allow you to list the actual song titles in the compact disc database.)

The *Versabase* programs allow up to 60 records per database file. You can increase this number by changing the value of Variable ME in Line 50. The main thing to consider when adding fields or allowing more records per file is that *Versabase* is designed to work with its data in memory — data items are stored in dimensioned arrays, not loaded from disk one record at a time. This makes it easier to manipulate the data but limits the size of *Versabase* files.

The limit on file size is based on the amount of free memory in your CoCo 3. Reducing the size of the fields gives you more room for other types of information. Also the CLEAR 8000 in Line 20 can be increased to allow a little more room.

When entering data, you might encounter a situation where you really need a few characters beyond the indicated field length. Since *Versabase* saves data to disk as a contiguous ASCII file, it is possible to have much longer data entries. You can add a few characters to a field by entering the record normally (observing the appropriate field lengths), then using the View/Edit option to change the information for a specific field. However, use this sparingly or you will soon encounter Out of Memory errors.

Versabase does not support any form of data sorting. The records are stored in the order in which you enter them. Consider adding data-sorting routines if you find them necessary.

Another possible change is to allow searches. It should be a simple matter to add a routine that scans certain array elements looking for a specific string of characters.

The printer codes used in Line 1040 are designed for Tandy printers. They are used to set the printer for bold, condensed type. You can change them for your specific printer if necessary. (For help, see "Printer Diversions and Conversions" on Page 142 of the August 1988 issue.)

After you have experimented with the existing code, try writing your own merge files to create more databases. It's easy to do. The possibilities are endless, and you'll find *Versabase* can handle most of your filing needs. ❑

ADDRESS.BAS:		COMPACT.BAS:	
Name	25	Title	25
Address	25	Composer	25
City	20	Orchestra	25
State	2	Tracks	2
Zip	10	Conductor	25
Phone	12	Soloist	20

PHOTOS.BAS:		MEDICINE.BAS:	
Date	8	Doctor	15
ASA	5	Person	15
F-Stop	5	Prescription	15
Shutter Speed	7	Number	9
Location	30	Date	8
Camera	15	Cost	7

Figure 2: Field Titles and Lengths

Definitions

Three terms are often confused when people speak of databases. To help minimize the confusion, let's define the terms.

A database *field* represents a single piece of information about a person, place, event, etc. The term *record* is used to mean all of the fields (individual pieces of information) about the single person, place, event, etc. A *file* is comprised of a related group of records about several persons, places, events, etc.

Using VCRDATA as an example, the file would hold information about all the VCR tapes you own. Each record would contain all the information about a specific tape, and the fields would be the title, star, tape number, etc., for that tape.

You can still have several different files, however. For instance, you might have one file with records for all of your tapes and another containing information about all of your best friend's tapes.

CoCo 3 Disk

Listing 1: VCRDATA

```
1 'VERSABASE/VCRDATA
2 'BY DAVID POLONSKY
3 'COPYRIGHT (C) JANUARY 1992
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
6 '*****************************
7 'THANKS TO BILL BERNICO FOR
   HIS SUBROUTINES AND IDEAS
20 CLEAR8000:WIDTH32:CLS:INPUT"4
0 OR 80 COLUMN WIDTH";W
30 IF W<>40 THEN 40 ELSE 50
40 IF W<>80 THEN 20 ELSE 50
```

```
50 ME=60:WIDTH W:RGB:PALETTE8,63
:PALETTE0,1:CLS1
60 DIM NM$(ME),AD$(ME),CT$(ME),S
T$(ME),BB$(ME),DP$(ME),FD$(6)
70 FD$(1)="TITLE":FD$(2)="STARRI
NG":FD$(3)="CO-STARRING":FD$(4)=
"TAPE # ":FD$(5)="DATE":FD$(6)="
COUNTER #"
80 WIDTH W:LOCATE15,7:ATTR3,3:PR
INT"DATABASE MENU";:ATTR0,0:PRIN
T
90 LOCATE12,9:PRINT"1. LOAD DATA
 FILE":LOCATE12,10:PRINT"2. SAVE
 DATA FILE":LOCATE12,11:PRINT"3.
 DATA ENTRY":LOCATE12,12:PRINT"4
. VIEW/EDIT DATA":LOCATE12,13:PR
INT"5. PRINT DATA":LOCATE12,14:P
RINT"6. TOGGLE WIDTH":LOCATE12,1
5:PRINT"7. QUIT PROGRAM
100 LOCATE12,17:ATTR1,0,B:PRINT"
YOUR CHOICE (1-7)";:ATTR0,0
110 K$=INKEY$:IFK$="" THEN 110 E
LSE P=VAL(K$):ON P GOTO 130,230,
330,570,930,1100,1120
120 GOTO110
130 LOCATE12,9:ATTR1,0:PRINT"1.
LOAD DATA FILE";:GOSUB1180:IFF$=
"" THEN80
140 OPEN"I",#1,F$:INPUT#1,NE
150 FORI=1 TO NE
160 LINEINPUT#1,NM$(I)
170 LINEINPUT#1,AD$(I)
180 LINEINPUT#1,CT$(I)
190 LINEINPUT#1,ST$(I)
200 LINEINPUT#1,BB$(I)
210 LINEINPUT#1,DP$(I)
220 NEXT:CLOSE#1:GOTO80
230 IFNE=0 THEN110
240 LOCATE12,10:ATTR1,0:PRINT"2.
 SAVE DATA FILE";:GOSUB1180:IFF$
="" THEN 80
250 OPEN"O",#1,F$:PRINT#1,NE
260 FORI=1 TO NE
270 PRINT#1,NM$(I):PRINT#1,AD$(I
)
280 PRINT#1,CT$(I)
290 PRINT#1,ST$(I)
300 PRINT#1,BB$(I)
310 PRINT#1,DP$(I)
320 NEXT:CLOSE#1:GOTO80
330 IFNE=ME THEN 110
340 NQ=NE+1
350 SF$="SPACE FOR"+STR$(ME-NQ)+
" MORE RECORDS":CLS:LOCATE4,0:AT
TR1,0:PRINT"VCRDATA RECORD #"NQ"
";:LOCATE4,1:PRINTSF$:ATTR0,0
360 LOCATE3,3:PRINT"    TITLE :"
:LY=3:AY=3:PL=31:GOSUB1230
370 LOCATE3,5:PRINT" STARRING :"
:LY=5:AY=4:PL=31:GOSUB1230
380 LOCATE3,7:PRINT"  CO-STAR :"
:LY=7:AY=2:PL=31:GOSUB1230
390 LOCATE3,9:PRINT"    TAPE# :"
:LY=9:AY=5:PL=6:GOSUB1230
400 LOCATE3,11:PRINT"     DATE :
":LY=11:AY=7:PL=9:GOSUB1230
410 LOCATE3,13:PRINT" COUNTER# :
 ":LY=13:AY=1:PL=6:GOSUB1230
420 LOCATE15,3:LINEINPUT D$:IFD$
="" THEN 80
430 IF LEN(D$)>30 THEN LOCATE15,
3:PRINTSTRING$(60,32):GOSUB1200:
LY=3:AY=3:PL=31:GOSUB1230:GOTO042
0
440 LOCATE15,5:LINEINPUT C$
450 IF LEN(C$)>30 THEN LOCATE15,
5:PRINTSTRING$(60,32):GOSUB1200:
LY=5:AY=4:PL=31:GOSUB1230:GOTO044
0
460 LOCATE15,7:LINEINPUT T$
470 IF LEN(T$)>30 THEN LOCATE15,
7:PRINTSTRING$(60,32):GOSUB1200:
LY=7:AY=2:PL=31:GOSUB1230:GOTO046
0
480 LOCATE15,9:LINEINPUT Y$
490 IF LEN(Y$)>5 THEN LOCATE15,9
:PRINTSTRING$(60,32):GOSUB1200:L
Y=9:AY=5:PL=6:GOSUB1230:GOTO480
500 LOCATE15,11:LINEINPUT X$
510 IF LEN(X$)>8 THEN LOCATE15,1
1:PRINTSTRING$(60,32):GOSUB1200:
LY=11:AY=7:PL=9:GOSUB1230:GOTO50
0
520 LOCATE15,13:LINEINPUT Z$
530 IF LEN(Z$)>5 THEN LOCATE15,1
3:PRINTSTRING$(60,32):GOSUB1200:
LY=13:AY=1:PL=6:GOSUB1230:GOTO52
0
540 FORXX=1TO300:NEXT
550 NE=NE+1:NM$(NE)=D$:AD$(NE)=C
$:CT$(NE)=T$:ST$(NE)=Y$:BB$(NE)=
X$:DP$(NE)=Z$
560 LOCATE4,16:ATTR1,0:PRINT"ENT
ER ANOTHER? ";:ATTR0,0
562 K$=INKEY$:IF K$="" THEN 562
564 IF K$="Y" OR K$="y" THEN 330
566 GOTO 80
570 IFNE=0 THEN 110
```


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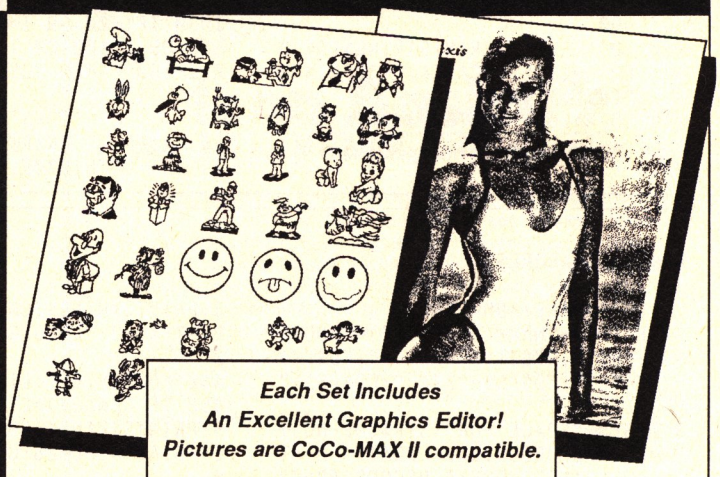

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```
580 WIDTH W:LOCATE8,4:ATTR1,0:IN
PUT"ENTER RECORD NUMBER ==> ";PT
582 IF PT<1 THEN 580
584 IF PT>NE THEN PT=NE
586 ATTR 0,0
590 WIDTH W
600 LOCATE6,2:ATTR1,0:PRINT"VCRD
ATA RECORD #"PT;:ATTR0,0
610 LOCATE0,4
620 PRINT"         TITLE : ";NM$(
PT)
630 PRINT"          STAR : ";AD$(
PT)
640 PRINT"       CO-STAR : ";CT$(
PT)
650 PRINT"        TAPE # : ";ST$(
PT)
660 PRINT"          DATE : ";BB$(
PT)
670 PRINT"    COUNTER # : ";DP$(
PT)
680 LOCATE2,23:ATTR1,0,B:PRINT"E
";:ATTR0,0:LOCATE3,23:PRINT"DIT"
;:ATTR1,0,B:LOCATE8,23:PRINT"N";
:ATTR0,0:LOCATE9,23:PRINT"EXT";:
ATTR1,0,B:LOCATE14,23:PRINT"P";:
ATTR0,0:LOCATE15,23:PRINT"REVIOU
S";
690 ATTR1,0,B:LOCATE24,23:PRINT"
M";:ATTR0,0:LOCATE25,23:PRINT"EN
U";:ATTR1,0,B:LOCATE30,23:PRINT"
W";:ATTR0,0:LOCATE31,23:PRINT"ID
TH";
700 K$=INKEY$:IFK$="M" THEN80
710 IFK$="P" THEN 760
720 IFK$="N" THEN 770
730 IFK$="E" THEN 780
740 IFK$="W"THEN 1210
750 GOTO700
760 IFPT=1 THEN700 ELSEPT=PT-1:G
OTO590
770 IFPT=NE THEN700 ELSEPT=PT+1:
GOTO590
780 LOCATE2,23:PRINTSTRING$(37,3
2);:FORI=1TO6:LOCATE1,I+3:PRINTU
SING"(#)";I;:NEXT
790 LOCATE6,12:ATTR3,3:PRINT"Pre
ss 1-6 To Edit - E To Exit";:ATT
R0,0
800 K$=INKEY$:IFK$="" THEN 800
810 IFK$="E" THEN 590
820 K=VAL(K$):IFK<1 OR K>6 THEN
800
830 LOCATE5,12:PRINTSTRING$(33,3
2);:LOCATE5,12:ATTR1,0:PRINT"NEW
 "FD$(K)": ";:LINEINPUT A$
840 ON K GOTO 850,860,870,880,89
0,900,910,920
850 NM$(PT)=A$:GOTO590
860 AD$(PT)=A$:GOTO590
870 CT$(PT)=A$:GOTO590
880 ST$(PT)=A$:GOTO590
890 BB$(PT)=A$:GOTO590
900 DP$(PT)=A$:GOTO590
910 GOTO590
920 GOTO590
930 IF NE=0 THEN 110
940 CLS1:INPUT"Print to (S)creen
 or (P)rinter? (S/P)";DN$:CLS1
950 IF W=80 THEN 980
960 IF W=40 THEN CLS:LOCATE 1,1:
PRINT"SCREEN LIST OPTION ONLY WI
TH 80-COLUMN  SCREEN. RETURN TO
MENU TO TOGGLE WIDTH
970 LOCATE 1,20:PRINT"HIT ANY KE
Y TO RETURN TO MENU":EXEC44539:G
OTO80
980 IF DN$="S"THEN DN=0:GOTO 101
0
990 IF DN$="P"THEN DN=-2:GOTO 10
40
1000 GOTO 940
1010 PRINT"NO. TITLE
    STAR              CO-STAR
      TAPE# DATE      CNTR#":PRIN
TSTRING$(79,45)
1020 FORI=1 TO NE:PRINTUSING"###
 %                    % %
     % %                % %   % %
     % %   %";I;NM$(I);AD$(I);CT
$(I);ST$(I);BB$(I);DP$(I)
1030 IFI=20 OR I=40 OR I=60 OR I
=80 OR I=100 OR I=120 OR I=140 O
R I=150  THEN GOSUB1160:CLS:PRIN
T"NO. TITLE                  STAR
           CO-STAR           TAP
E# DATE     CNTR#":PRINTSTRING$(
79,45):GOTO1070ELSE1070
1040 PRINT#-2,CHR$(27);CHR$(31);
CHR$(27);CHR$(20);CHR$(15):PRINT
#-2,"NO.  TITLE
       STARRING
      CO-STARRING
     TAPE#  DATE       CNTR#":PR
INT#-2,""
1051 FORI=1TONE:PRINT#-2,USING"#
## %
% %                              %
 %                              %
%   %  %      %  %   %";I;NM$(I)
;AD$(I);CT$(I);ST$(I);BB$(I);DP$
(I):PRINT#-2,""
1060 IFI=30 OR I=60 OR I=90 OR I
=120 OR I=150 THEN CLS:PLAY"O4T6
0CBCBCBC":PRINT"INSERT NEXT PAGE
 AND HIT <ENTER> TO CONTINUE PRI
NTING":PRINT#-2,CHR$(12):GOSUB11
60:CLS
1070 NEXT I
1080 IF DN=0 THEN GOSUB1160
1090 GOTO80
1100 IF W=40 THEN W=80:GOTO 80
1110 IF W=80 THEN W=40:GOTO 80
1120 LOCATE12,17:ATTR1,0:PRINT"A
RE YOU SURE? (Y/N)";:ATTR0,0:PLA
Y"O4T60CBCBCBCBCBC
1130 K$=INKEY$:IFK$="N" THEN 80
1140 IFK$<>"Y" THEN 1130
1150 WIDTH32:ATTR0,0:PALETTE8,0:
PALETTE0,63:END
1160 LOCATE5,23:PRINT"Press <ENT
ER> To Continue";
1170 IFINKEY$<>CHR$(13) THEN 117
0 ELSE RETURN
1180 LOCATE12,17:PRINTSTRING$(17
,32);:LOCATE15,17:PRINT"Filename
: ";:LINEINPUT F$
1190 RETURN
1200 ATTR1,0:SOUND191,1:LOCATE3,
18:PRINT"INPUT TOO LONG!  TRY AG
AIN";:FOR X=1 TO 700:NEXT:ATTR 0
,0:LOCATE3,18:PRINTSTRING$(28,32
):RETURN
1210 IF W=40 THEN W=80:GOTO 590
1220 IF W=80 THEN W=40:GOTO 590
1230 LOCATE 15,LY:ATTR 2,AY:PRIN
TSTRING$(PL,32);:ATTR0,0:RETURN
```

Listing 2: ADDRESS

```
1 'VERSABASE/ADDRESS
70 FD$(1)="NAME  ":FD$(2)="ADDRE
SS":FD$(3)="CITY        ":FD$(4)
="STATE ":FD$(5)="ZIP ":FD$(6)="
PHONE  "
350 SF$="SPACE FOR"+STR$(ME-NQ)+
" MORE RECORDS":CLS:LOCATE4,0:AT
TR1,0:PRINT"ADDRESS RECORD #"NQ"
";:LOCATE4,1:PRINTSF$:ATTR0,0
360 LOCATE3,3:PRINT"     NAME :"
:LY=3:AY=3:PL=26:GOSUB1230
370 LOCATE3,5:PRINT"  ADDRESS :"
:LY=5:AY=4:PL=26:GOSUB1230
380 LOCATE3,7:PRINT"     CITY :"
:LY=7:AY=2:PL=21:GOSUB1230
390 LOCATE3,9:PRINT"    STATE :"
:LY=9:AY=5:PL=3:GOSUB1230
400 LOCATE3,11:PRINT"      ZIP :
":LY=11:AY=7:PL=11:GOSUB1230
410 LOCATE3,13:PRINT"    PHONE :
":LY=13:AY=1:PL=13:GOSUB1230
420 LOCATE15,3:LINEINPUT D$:IFD$
="" THEN 80
430 IF LEN(D$)>25 THEN LOCATE15,
3:PRINTSTRING$(60,32):GOSUB1200:
LY=3:AY=3:PL=26:GOSUB1230:GOTO42
0
440 LOCATE15,5:LINEINPUT C$
450 IF LEN(C$)>25 THEN LOCATE15,
5:PRINTSTRING$(60,32):GOSUB1200:
LY=5:AY=4:PL=26:GOSUB1230:GOTO44
0
460 LOCATE15,7:LINEINPUT T$
470 IF LEN(T$)>20 THEN LOCATE15,
7:PRINTSTRING$(60,32):GOSUB1200:
LY=7:AY=2:PL=21:GOSUB1230:GOTO46
0
480 LOCATE15,9:LINEINPUT Y$
490 IF LEN(Y$)>2 THEN LOCATE15,9
:PRINTSTRING$(60,32):GOSUB1200:L
Y=9:AY=5:PL=3:GOSUB1230:GOTO480
500 LOCATE15,11:LINEINPUT X$
510 IF LEN(X$)>10 THEN LOCATE15,
11:PRINTSTRING$(60,32):GOSUB1200
:LY=11:AY=7:PL=11:GOSUB1230:GOTO
500
520 LOCATE15,13:LINEINPUT Z$
530 IF LEN(Z$)>12 THEN LOCATE15,
13:PRINTSTRING$(60,32):GOSUB1200
:LY=13:AY=1:PL=13:GOSUB1230:GOTO
520
600 LOCATE6,2:ATTR1,0:PRINT"CLER
ICAL RECORD #"PT;:ATTR0,0
610 LOCATE0,4
620 PRINT"         NAME : ";NM$(
PT)
630 PRINT"      ADDRESS : ";AD$(
PT)
640 PRINT"         CITY : ";CT$(
PT)
650 PRINT"        STATE : ";ST$(
PT)
660 PRINT"          ZIP : ";BB$(
PT)
670 PRINT"        PHONE : ";DP$(
PT)
1010 PRINT"NO. NAME
    ADDRESS              CITY
     ST ZIP   PHONE  ":PRINTSTRI
NG$(79,45)
1020 FORI=1 TO NE:PRINTUSING"###
 %                    % %
```

```
        % %           % %% %    %
%          %";I;NM$(I);AD$(I);CT
$(I);ST$(I);BB$(I);DP$(I)
1030 IFI=20 OR I=40 OR I=60 OR I
=80 OR I=100 OR I=120 OR I=140 O
R I=150  THEN GOSUB1160:CLS:PRIN
T"NO. NAME                  ADDRE
SS              CITY          ST Z
IP    PHONE":PRINTSTRING$(79,45):
GOTO1070ELSE1070
1040 PRINT#-2,CHR$(27);CHR$(31);
CHR$(27);CHR$(20);CHR$(15):PRINT
#-2,"NO. NAME
   ADDRESS                    CIT
Y                  ST  ZIP
  PHONE       "
1051 FORI=1TONE:PRINT#-2,USING"#
## %                       % %
                    % %
        % %%  %         %  %
      %";I;NM$(I);AD$(I);CT$(I)
;ST$(I);BB$(I);DP$(I)
```

Listing 3: COMPACT

```
1 'VERSABASE/COMPACT
70 FD$(1)="TITLE":FD$(2)="COMPOS
ER":FD$(3)="ORCHESTRA":FD$(4)="T
RACKS":FD$(5)="CONDUCTOR":FD$(6)
="SOLOIST"
350 SF$="SPACE FOR"+STR$(ME-NQ)+
" MORE RECORDS":CLS:LOCATE4,0:AT
TR1,0:PRINT"COMPACT DISK RECORD
#"NQ"";:LOCATE4,1:PRINTSF$:ATTR0
,0
360 LOCATE3,3:PRINT"    TITLE :"
:LY=3:AY=3:PL=26:GOSUB1230
370 LOCATE3,5:PRINT" COMPOSER :"
:LY=5:AY=4:PL=26:GOSUB1230
380 LOCATE3,7:PRINT"ORCHESTRA :"
:LY=7:AY=2:PL=26:GOSUB1230
390 LOCATE3,9:PRINT"   TRACKS :"
:LY=9:AY=5:PL=3:GOSUB1230
400 LOCATE3,11:PRINT"CONDUCTOR :
":LY=11:AY=7:PL=26:GOSUB1230
410 LOCATE3,13:PRINT"  SOLOIST :
":LY=13:AY=1:PL=21:GOSUB1230
420 LOCATE15,3:LINEINPUT D$:IFD$
="" THEN 80
430 IF LEN(D$)>25 THEN LOCATE15,
3:PRINTSTRING$(60,32):GOSUB1200:
LY=3:AY=3:PL=26:GOSUB1230:GOTO42
0
440 LOCATE15,5:LINEINPUT C$
450 IF LEN(C$)>25 THEN LOCATE15,
5:PRINTSTRING$(60,32):GOSUB1200:
LY=5:AY=4:PL=26:GOSUB1230:GOTO44
0
460 LOCATE15,7:LINEINPUT T$
470 IF LEN(T$)>25 THEN LOCATE15,
7:PRINTSTRING$(60,32):GOSUB1200:
LY=7:AY=2:PL=26:GOSUB1230:GOTO46
0
480 LOCATE15,9:LINEINPUT Y$
490 IF LEN(Y$)>2 THEN LOCATE15,9
:PRINTSTRING$(60,32):GOSUB1200:L
Y=9:AY=5:PL=3:GOSUB1230:GOTO480
500 LOCATE15,11:LINEINPUT X$
510 IF LEN(X$)>25 THEN LOCATE15,
11:PRINTSTRING$(60,32):GOSUB1200
:LY=11:AY=7:PL=26:GOSUB1230:GOTO
500
520 LOCATE15,13:LINEINPUT Z$
530 IF LEN(Z$)>20 THEN LOCATE15,
13:PRINTSTRING$(60,32):GOSUB1200
:LY=13:AY=1:PL=21:GOSUB1230:GOTO
520
600 LOCATE6,2:ATTR1,0:PRINT"COMP
ACT DISK RECORD #"PT;:ATTR0,0
610 LOCATE0,4
620 PRINT"        TITLE : ";NM$(
PT)
630 PRINT"     COMPOSER : ";AD$(
PT)
640 PRINT"    ORCHESTRA : ";CT$(
PT)
650 PRINT"       TRACKS : ";ST$(
PT)
660 PRINT"    CONDUCTOR : ";BB$(
PT)
670 PRINT"      SOLOIST : ";DP$(
PT)
1010 PRINT"NO. TITLE
    COMPOSER              ORCHEST
RA       TRKS CONDUCTOR":PRINTST
RING$(79,45)
1020 FORI=1 TO NE:PRINTUSING"###
 %                  % %
         % %              %  %%
%          %";I;NM$(I);AD$(I);CT
$(I);ST$(I);BB$(I)
1030 IFI=20 OR I=40 OR I=60 OR I
=80 OR I=100 OR I=120 OR I=140 O
R I=150  THEN GOSUB1160:CLS:PRIN
T"NO. TITLE                 COMPO
SER              ORCHESTRA
TRKS CONDUCTOR":PRINTSTRING$(79,
```


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```
45):GOTO1070ELSE1070
1040 PRINT#-2,CHR$(27);CHR$(31);
CHR$(27);CHR$(20);CHR$(15):PRINT
#-2,"NO. TITLE
   COMPOSER                    ORC
HESTRA                    TRACKS CO
NDUCTOR                    SOLOIST
                ":PRINT#-2,""
1051 FORI=1TONE:PRINT#-2,USING"#
## %                          % %
                                  % %
                                %   %%   %
                                 % %
    %";I;NM$(I);AD$(I);CT$(I);S
T$(I);BB$(I);DP$(I):PRINT#-2,""
```

Listing 4: PHOTOS

```
1 'VERSABASE/PHOTOS
70 FD$(1)="DATE":FD$(2)="ASA":FD
$(3)="F-STOP":FD$(4)="SHUTTER SP
EED":FD$(5)="LOCATION":FD$(6)="C
AMERA"
350 SF$="SPACE FOR"+STR$(ME-NQ)+
" MORE RECORDS":CLS:LOCATE4,0:AT
TR1,0:PRINT"PHOTO RECORD #"NQ"";
:LOCATE4,1:PRINTSF$:ATTR0,0
360 LOCATE3,3:PRINT"     DATE :"
:LY=3:AY=3:PL=9:GOSUB1230
370 LOCATE3,5:PRINT"      ASA :"
:LY=5:AY=4:PL=6:GOSUB1230
380 LOCATE3,7:PRINT"   F-STOP :"
:LY=7:AY=2:PL=6:GOSUB1230
390 LOCATE3,9:PRINT"  SHUTTER :"
:LY=9:AY=5:PL=8:GOSUB1230
400 LOCATE3,11:PRINT" LOCATION :
":LY=11:AY=7:PL=31:GOSUB1230
410 LOCATE3,13:PRINT"   CAMERA :
":LY=13:AY=1:PL=16:GOSUB1230
420 LOCATE15,3:LINEINPUT D$:IFD$
="" THEN 80
430 IF LEN(D$)>8 THEN LOCATE15,3
:PRINTSTRING$(60,32):GOSUB1200:L
Y=3:AY=3:PL=9:GOSUB1230:GOTO420
440 LOCATE15,5:LINEINPUT C$
450 IF LEN(C$)>5 THEN LOCATE15,5
:PRINTSTRING$(60,32):GOSUB1200:L
Y=5:AY=4:PL=6:GOSUB1230:GOTO440
460 LOCATE15,7:LINEINPUT T$
470 IF LEN(T$)>5 THEN LOCATE15,7
:PRINTSTRING$(60,32):GOSUB1200:L
Y=7:AY=2:PL=6:GOSUB1230:GOTO460
480 LOCATE15,9:LINEINPUT Y$
490 IF LEN(Y$)>7 THEN LOCATE15,9
:PRINTSTRING$(60,32):GOSUB1200:L
Y=9:AY=5:PL=8:GOSUB1230:GOTO480
500 LOCATE15,11:LINEINPUT X$
510 IF LEN(X$)>30 THEN LOCATE15,
11:PRINTSTRING$(60,32):GOSUB1200
:LY=11:AY=7:PL=31:GOSUB1230:GOTO
500
520 LOCATE15,13:LINEINPUT Z$
530 IF LEN(Z$)>15 THEN LOCATE15,
13:PRINTSTRING$(60,32):GOSUB1200
:LY=13:AY=1:PL=16:GOSUB1230:GOTO
520
600 LOCATE6,2:ATTR1,0:PRINT"PHOT
O RECORD #"PT;:ATTR0,0
610 LOCATE0,4
620 PRINT"          DATE : ";NM$(
PT)
630 PRINT"           ASA : ";AD$(
PT)
640 PRINT"       F-STOP : ";CT$(
PT)
650 PRINT"SHUTTER SPEED : ";ST$(
PT)
660 PRINT"     LOCATION : ";BB$(
PT)
670 PRINT"       CAMERA : ";DP$(
PT)
1010 PRINT"NO. DATE     ASA   F-
STOP SHUTTER LOCATION
          CAMERA":PRINTSTRING$(
79,45)
1020 FORI=1 TO NE:PRINTUSING"###
 %      % %   % %   %  %     % %
                              % %
          %";I;NM$(I);AD$(I);CT
$(I);ST$(I);BB$(I);DP$(I)
1030 IFI=20 OR I=40 OR I=60 OR I
=80 OR I=100 OR I=120 OR I=140 O
R I=150 THEN GOSUB1160:CLS:PRINT
"NO. DATE     ASA   F-STOP SHUTT
ER LOCATION
 CAMERA":PRINTSTRING$(79,45):GOT
O1070ELSE1070
1040 PRINT#-2,CHR$(27);CHR$(31);
CHR$(27);CHR$(20);CHR$(15):PRINT
#-2,"NO. DATE      ASA    F-STOP
  SHUTTER  LOCATION
           CAMERA          ":PRIN
T#-2
1051 FORI=1TONE:PRINT#-2,USING"#
## %      %  %   %  %   %   %
  %  %
  %  %              %";I;NM$(I);A
D$(I);CT$(I);ST$(I);BB$(I);DP$(I
):PRINT#-2
```

Listing 5: MEDICINE

```
1 'VERSABASE/MEDICINE
70 FD$(1)="DOCTOR":FD$(2)="PERSO
N":FD$(3)="PRESCRIPTION":FD$(4)=
"NUMBER":FD$(5)="DATE":FD$(6)="C
OST"
350 SF$="SPACE FOR"+STR$(ME-NQ)+
" MORE RECORDS":CLS:LOCATE4,0:AT
TR1,0:PRINT"MEDICAL RECORD #"NQ"
";:LOCATE4,1:PRINTSF$:ATTR0,0
360 LOCATE3,3:PRINT"   DOCTOR :"
:LY=3:AY=3:PL=16:GOSUB1230
370 LOCATE3,5:PRINT"   PERSON :"
:LY=5:AY=4:PL=16:GOSUB1230
380 LOCATE3,7:PRINT"PRESCRIPT :"
:LY=7:AY=2:PL=16:GOSUB1230
390 LOCATE3,9:PRINT"   NUMBER :"
:LY=9:AY=5:PL=10:GOSUB1230
400 LOCATE3,11:PRINT"     DATE :
":LY=11:AY=7:PL=9:GOSUB1230
410 LOCATE3,13:PRINT"     COST :
":LY=13:AY=1:PL=8:GOSUB1230
420 LOCATE15,3:LINEINPUT D$:IFD$
="" THEN 80
430 IF LEN(D$)>15 THEN LOCATE15,
3:PRINTSTRING$(60,32):GOSUB1200:
LY=3:AY=3:PL=16:GOSUB1230:GOTO42
0
440 LOCATE15,5:LINEINPUT C$
450 IF LEN(C$)>15 THEN LOCATE15,
5:PRINTSTRING$(60,32):GOSUB1200:
LY=5:AY=4:PL=16:GOSUB1230:GOTO44
0
460 LOCATE15,7:LINEINPUT T$
470 IF LEN(T$)>15 THEN LOCATE15,
7:PRINTSTRING$(60,32):GOSUB1200:
LY=7:AY=2:PL=16:GOSUB1230:GOTO46
0
480 LOCATE15,9:LINEINPUT Y$
490 IF LEN(Y$)>9 THEN LOCATE15,9
:PRINTSTRING$(60,32):GOSUB1200:L
Y=9:AY=5:PL=10:GOSUB1230:GOTO480
500 LOCATE15,11:LINEINPUT X$
510 IF LEN(X$)>8 THEN LOCATE15,1
1:PRINTSTRING$(60,32):GOSUB1200:
LY=11:AY=7:PL=9:GOSUB1230:GOTO50
0
520 LOCATE15,13:LINEINPUT Z$
530 IF LEN(Z$)>7 THEN LOCATE15,1
3:PRINTSTRING$(60,32):GOSUB1200:
LY=13:AY=1:PL=8:GOSUB1230:GOTO52
0
600 LOCATE6,2:ATTR1,0:PRINT"MEDI
CAL RECORD #"PT;:ATTR0,0
610 LOCATE0,4
620 PRINT"        DOCTOR : ";NM$(
PT)
630 PRINT"        PERSON : ";AD$(
PT)
640 PRINT" PRESCRIPTION : ";CT$(
PT)
650 PRINT"        NUMBER : ";ST$(
PT)
660 PRINT"          DATE : ";BB$(
PT)
670 PRINT"          COST : ";DP$(
PT)
1010 PRINT"NO. DOCTOR          P
ERSON          PRESCRIPTION    N
UMBER    DATE     COST":PRINTSTR
ING$(79,45)
1020 FORI=1 TO NE:PRINTUSING"###
 %             % %            %
 %             % %       % %
  % %     %";I;NM$(I);AD$(I);CT$
(I);ST$(I);BB$(I);DP$(I)
1030 IFI=20 OR I=40 OR I=60 OR I
=80 OR I=100 OR I=120 OR I=140 O
R I=150  THEN GOSUB1160:CLS:PRIN
T"NO. DOCTOR          PERSON
      PRESCRIPTION    NUMBER
DATE     COST":PRINTSTRING$(79,4
5):GOTO1070ELSE1070
1040 PRINT#-2,CHR$(27);CHR$(31);
CHR$(27);CHR$(20);CHR$(15):PRINT
#-2,"NO. DOCTOR          PERSON
         PRESCRIPTION    NUMBER
   DATE     COST   "
1051 FORI=1TONE:PRINT#-2,USING"#
## %             % %
 % %             % %       % %
    % %     %";I;NM$(I);AD$(I);C
T$(I);ST$(I);BB$(I);DP$(I)
```

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Uppercase Directories

by Greg Law
Technical Editor

After using our new `makedir` utility (April 1991, Page 28) for a while, I began thinking of ways in which it might be improved. One idea that seems the most beneficial is to automatically convert all of the directory names to uppercase. The fact that directory names should always be in all uppercase as a de-facto standard further enhances the idea.

For the insatiably curious, directory names appear in all uppercase to make it easier to distinguish (lowercase) filenames from directories.

The modification involves creating a new function that converts a string from a combination of upper- and lowercase letters to all uppercase. This function must be created because no similar function exists in the C library. However, the C library does include the `toupper()` and `tolower()` functions that convert a single character to either its upper- or lowercase counterpart. And it is the `toupper()` function on which our `strupr()` function is based.

The `strupr()` function (shown in the listing) is passed a pointer to a null-terminated string, which is called `s` in the listing. A `while` loop is then used to compare the

In addition to being OS-9 Online SIGop, Greg Law enjoys programming on all types of computers and has worked on systems ranging from the CoCo to the Burroughs B6700 super mainframe. He lives in Louisville, Kentucky.

OS-9

The Listing: `makedir.c`

```
#include <modes.h>
#include <stdio.h>
#include <string.h>

main(argc, argv)
int  argc;
char *argv[];
{
     char *path;
     char *ptr;
     int  i = 0;

     if(argc < 2)
          help(argv[0]);

     while(-argc)
     {
          ptr = path = argv[++i];
          strupr(ptr);

          if(path[0] == '/' || path[0] == '.')
               ptr = index(ptr + 1, '/') + 1;

          while((ptr = index(ptr, '/')) != 0)
          {
               *ptr = '\0';
               I_MakDir(path);
               *ptr = '/';
               ptr++;
          }

          I_MakDir(path);
```

```
    }
}

I_MakDir(path)
char *path;
{
     int status;

     status = mknod(path, 077);

     if(status == -1)
          printf("%-40s - ERROR %03d\n", path, errno);
     else
          printf("%-40s - created\n", path);
}

help(name)
char *name;
{
     printf("This utility is used to create multiple directories\n");
     printf("and subdirectories in one pass. It will also create\n");
     printf("all directories specified in a pathlist as required\n");
     printf("\n");
     printf("The syntax for %s is: \n", name);
     printf("     %s pathlist <pathlist> <...>\n", name);
     exit(0);
}

strupr(s)
char *s;
{
     while(*s != '\0')
          *s++ = toupper(*s);
}
```

character pointed to by s to the null character. If the character is null, the `while` loop is terminated and the function returns to the caller. Inside the `while` loop, each character is converted to uppercase by

```
*s = toupper(*s)
```

and the pointer is incremented to the address of the next character in the string (s++).

As you can see, operator precedence rules are used to advantage in this one statement so that it performs two operations. I warned you a long time ago that operator precedence plays a major role in programming, especially with C. In this case the pointer (*) and assignment (=) operators have higher precedence than the post-increment (++) operator. The net effect is that the statement is equivalent to

```
*s = toupper(*s);
s++;
```

with less overhead.

For an equivalent function that converts a string to lowercase, change the name of the function to `strlwr()` and change `toupper(*s)` to `tolower(*s)`. The remainder of the function is the same.

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Zig-Zag

by William P. Nee

Zig-Zag is based on the first computer game I ever bought, RCA's *Studio II*. In addition to playing BlackJack and Bowling, *Studio II* allows you to program a simple pattern, then keep repeating that pattern over the entire screen. Any time the pattern crosses itself, black changes to white and white to black.

Now, twenty years later, I've updated this game to work on the CoCo, adding color and the speed of machine language. *Zig-Zag* lets you predefine a pattern as a string variable rather than making you enter it each time. The pattern starts at the lower-left corner, and each successive square used to create it can be in any of eight different directions — I used the DRAW command directions (U, D, R, L, E, F, G, and H). As you press these keys, squares appear forming the pattern. When you press ENTER, the pattern starts repeating.

The key to the pattern changing is what the cursor does when it reaches a border. Look at Line 290 of the BASIC program shown in Listing 1. If you press F, the program transfers control to Line 390, where the *x* location is increased by 1. If the value in this location is greater than the right boundary (63), two things happen: First the *x* location is reset to zero and the *y* location is increased by one. (If this becomes greater than the height, 31, it wraps back to zero). Second, the *y* location is again increased by one (and may be reset to zero). For example, if the cursor is at Location (63,31), pressing F moves it to (0,1).

As I mentioned before, when the pattern crosses itself, the colors at that point reverse. This happens when you're creating the pattern and while it is being repeated. When the pattern goes over a square, the new color is drawn and the value of that square increased. Program options allow you to select black-and-white or color patterns, and have the program read a pattern from a DATA statement, poking the direction letters into the movement array.

The machine-language program shown in Listing 2 starts with four macros: one to clear the MOVE and ARRAY locations, two to PSET and PRESET black and white, and one to CPSET color. Then each letter in the MOVE array is read, the *x* and *y* locations are adjusted accordingly, that square is PSET, and the value in the array is increased. Press any key to stop the program and return to BASIC.

Enter and save Listing 1 to disk as ZIGZAGDR.BAS. After you've entered Listing 2, check it for errors by entering A/NO/NS/WE. Then save it using W ZIGZAG.ASM and assemble it into machine language by entering A ZIGZAG.BIN /NS/WE.

When you run it, the BASIC program loads the machine-language portion. The machine-language routine uses the CLEAR macro to clear a one-dimensional array of 256 bytes for the pattern and a 63-by-31-byte, two-dimensional array for the values of each square. To see the program in action, choose the Black-and-White and the Enter-Your-Own options. Then press five E's followed by four H's and ENTER. Now try this same pattern using the Color option. Next use the Read Data option, making sure one of the REM markers is removed from one of the lines between 560 and 610.

Even though the display is only 63 by 31, it fills the entire screen by drawing each square as a 2-by-3 rectangle. One possible change would be to make the actual display larger. Since the MOVE array is only 256 bytes in length, that is the largest pattern you can use. Try increasing the size of this array and having the program read each individual direction instead of the string pattern.

There it is — a 20-year-old computer game updated for current computers. We've certainly come a long way in two decades. I appreciate hearing from you, so send me your comments and ideas for future articles. If you have any questions about these articles or machine-language programming in general, don't hesitate to write. Next month I'll show you my version of a popular Russian video game. ❑

Bill Nee bucked the snowbird trend by retiring to Wisconsin from a banking career in Florida. The success of his 13-part series, "Machine Language Made BASIC" (July 1988 to July 1989), prompted him to continue writing articles about Color Computer machine-language programming. You may contact Bill at Route 2, Box 216C, Mason, WI 54856-9302, (715) 746-2952. Please include an SASE when requesting a reply.

32K Disk

Listing 1: ZIGZAGDR

```
1 'THE ASSEMBLY LINE
2 'WRITTEN BY WILLIAM P. NEE
3 'COPYRIGHT (C) FEBRUARY 1992
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 PMODE1,1:PCLEAR2
20 IF PEEK(&H4000)<>204 THEN LOA
DM"ZIGZAG":POKE &HFF40,0
30 CLEAR 500,&H4000-1
40 LX=63:LY=31:X=0:Y=LY
50 CO=&H4550:MV=&H4553:LO=&H4653
60 XL=&H454A:YL=&H454B
70 EXEC &H4000
80 CLS:PRINT"1> BLACK & WHITE","
   2> COLOR"
90 A$=INKEY$:IF A$="" THEN 90
100 C=VAL(A$):IF C<1 OR C>2 THEN
 80
110 POKE CO,C-1
120 PRINT:PRINT"1> READ DATA",,"
   2> ENTER YOUR OWN"
130 A$=INKEY$:IF A$="" THEN 130
140 IF A$="2" THEN 230
150 IF A$<>"1" THEN 120
160 READ M$:L=LEN(M$)
170 PRINT:PRINT" READING -":PRIN
TM$:PRINT@224,"";
180 FOR N=1 TO L:A$=MID$(M$,N,1)
190 POKE MV+N-1,ASC(A$):PRINTCHR
$(ASC(A$)+32);:NEXT
200 POKE XL,X:POKE YL,Y
210 IF C=1 THEN PMODE 0,1:COLOR0
,5:PCLS:SCREEN1,1:EXEC &H4100:ST
OP
220 PMODE 1,1:PCLS:SCREEN1,1:EXE
C &H4100:STOP
230 IF C=1 THEN PMODE0,1:COLOR0,
5:PCLS:SCREEN1,1:GOTO 250
240 C=3:PMODE1,1:PCLS:SCREEN1,1
250 A$=INKEY$:IF A$="" THEN 250
260 IF A$=CHR$(13) THEN SOUND 50
,5:POKE XL,X:POKE YL,Y:EXEC &H41
00:END
270 SOUND 100,2
280 IF A$="E" THEN POKE MV+K,69:
GOTO 370
290 IF A$="F" THEN POKE MV+K,70:
GOTO 390
300 IF A$="G" THEN POKE MV+K,71:
GOTO 410
310 IF A$="H" THEN POKE MV+K,72:
GOTO 430
320 IF A$="U" THEN POKE MV+K,85:
GOTO 450
330 IF A$="R" THEN POKE MV+K,82:
GOTO 460
340 IF A$="D" THEN POKE MV+K,68:
GOTO 480
350 IF A$="L" THEN POKE MV+K,76:
GOTO 490
360 GOTO 280
370 X=X+1:IF X>LX THEN X=0:Y=(Y+
1) AND LY
380 Y=(Y-1) AND LY:GOTO 500
390 X=X+1:IF X>LX THEN X=0:Y=(Y+
1) AND LY
400 Y=(Y+1) AND LY:GOTO 500
410 X=X-1:IF X<0 THEN X=LX:Y=(Y-
1) AND LY
420 Y=(Y+1) AND LY:GOTO 500
430 X=X-1:IF X<0 THEN Y=(Y-1) AN
D LY
440 Y=(Y-1) AND LY:GOTO 500
450 Y=(Y-1) AND LY:GOTO 500
460 X=X+1:IF X>LX THEN X=0:Y=(Y+
1) AND LY
470 GOTO 500
480 Y=(Y+1) AND LY:GOTO 500
490 X=X-1:IF X<0 THEN X=LX:Y=(Y-
1) AND LY
500 V=PEEK(LO+Y*(LX+1)+X)
510 COLOR V,5
520 LINE(4*X,6*Y)-(4*X+2,6*Y+4),
PSET,BF
530 V=(V+1) AND C:POKE LO+Y*(LX+
1)+X,V
540 K=K+1:GOTO 250
550 'SAMPLE MOVES
560 'DATA "ERRRRRRRRRRRRRHLLLLL
LLLLLLLERRRRRRRRRRHLLLLLLLLERRRR
RRHLLLLERRH"
570 'DATA "UUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUFFFFFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFDDDDDDDDDDDDDDDDDDDD
DDDDDDDDDDDDGGGGGGGGGGGGGGGGGGGG
GGGGGGGGGG"
580 'DATA "EEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEFFFFFFFFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
FFFFF"
590 'DATA "EEEEEHHHHEEEEHHHHEEEE
HHHH"
600 'DATA "EUUUUUUUUUUUUURRRRRRR
RRRRRRRRDDDDDDDDDDDDDLLLLLLLLL
LLLLLLEEGEUUUUUUUUUURRRRRRRRRRR
DDDDDDDDDDLLLLLLLLLLLEEGEUUUUUU
URRRRRRRDDDDDDLLLLLLLEEGEUUURRR
DDDLLLEEGEEEGEEEGEEEGEEEGE"
610 'DATA "ERRLRRRRLRRRRLRRRRLRR
RRLRRRRLRRRRLRRHLLRLLLLRLLLLRLLL
LRLLLLRLLLLRLLERRLRRRRLRRRRLRRRR
LRRRRLRRHLLRLLLLRLLLLRLLLRLLERR
LRRRRLRRRRLRRHLLRLLLLRLLG"
```

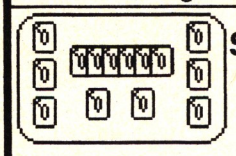
Listing 2: ZIGZAG.ASM

```
00100 CLEAR   MACRO
00110         LDD     #0
00120         LDX     #\0     START HERE
00130 \.A     STD     ,X++
00140         CMPX    #\1     END HERE
00150         BLO     \.A
00160         ENDM
00170
00180 PRESET  MACRO
00190         LDA     \1
00200.        LDB     $B9     BYTES/LINE
00210         MUL
00220         ADDA    $BA     START OF GRAPHICS
00230         TFR     D,X
00240         LDB     \0
00250         LSRB
00260         LSRB
00270         LSRB
00280         ABX             BYTE
00290         LDA     \0
00300         ANDA    #7      BIT
00310         LDY     #$92DD  OR TABLE
00320         LDA     A,Y
00330         ORA     ,X
00340         STA     ,X
00350         ENDM
00360
00370 PSET    MACRO
00380         LDA     \1
00390         LDB     $B9
00400         MUL
00410         ADDA    $BA
00420         TFR     D,X
00430         LDB     \0
00440         LSRB
00450         LSRB
00460         LSRB
00470         ABX
00480         LDA     \0
00490         ANDA    #7
00500         LDY     #$92DD
00510         LDA     A,Y
00520         COMA
00530         ANDA    ,X
00540         STA     ,X
00550         ENDM
00560
00570 CPSET   MACRO
00580         LDA     \1
00590         LDB     $B9
00600         MUL
00610         ADDA    $BA
```

```
00620          TFR     D,X
00630          LDB     \Ø
00640          LSRB
00650          LSRB
00660          ABX
00670          LDA     \Ø
00680          ANDA    #3
00690          LDY     #$92E5  COLOR OR TABLE
00700          LDA     A,Y
00710          TFR     A,B
00720          COMA
00730          ANDA    ,X
00740          ANDB    $B5     CURRENT COLOR
00750          PSHS    B
00760          ORA     ,S+
00770          STA     ,X
00780          ENDM
00790
00800          ORG     $4000
00810 START    CLEAR   MOVE,ARRAY+$1000
00820          RTS
00830
00840          ORG     $4100
00850 PARSE    LDU     #MOVE
00860 P1       LDA     ,U+     GET A DIRECTION
00870          CMPA    #'E     IS IT "E"
00880          BNE     FF      IF NOT,GO TO NEXT ONE
00890          INC     XCORD   X=X+1
00900          LDA     XCORD    IF
00910          CMPA    LENX     X>63
00920          BLS     EE1
00930          CLR     XCORD    THEN X=Ø:
00940          LDB     YCORD    Y=
00950          INCB             Y+1
00960          ANDB    LENY     AND 31
00970          STB     YCORD
00980 EE1      LDB     YCORD   Y=
00990          DECB             Y-1
01000          ANDB    LENY     AND 31
01010          STB     YCORD
01020          LBRA    WHICH
01030
01040 FF       CMPA    #'F
01050          BNE     GG
01060          INC     XCORD
01070          LDA     XCORD
01080          CMPA    LENX
01090          BLS     FF1
01100          CLR     XCORD
01110          LDB     YCORD
01120          INCB
01130          ANDB    LENY
01140          STB     YCORD
01150 FF1      LDB     YCORD
01160          INCB
01170          ANDB    LENY
01180          STB     YCORD
01190          LBRA    WHICH
01200
01210 GG       CMPA    #'G
01220          BNE     HH
01230          DEC     XCORD   X=X-1
01240          LDA     XCORD    IF X<Ø
01250          BPL     GG1
01260          LDA     LENX     THEN
01270          STA     XCORD    X=63:
01280          LDB     YCORD    Y=
01290          DECB             Y-1
01300          ANDB    LENY     AND 31
01310          STB     YCORD
01320 GG1      LDB     YCORD   Y=
01330          INCB             Y+1
01340          ANDB    LENY     AND 31
01350          STB     YCORD
01360          LBRA    WHICH
01370
01380 HH       CMPA    #'H
01390          BNE     UU
01400          DEC     XCORD
01410          LDA     XCORD
01420          BPL     HH1
01430          LDA     LENX
01440          STA     XCORD
01450          LDB     YCORD
01460          DECB
01470          ANDB    LENY
01480          STB     YCORD
01490 HH1      LDB     YCORD
01500          DECB
01510          ANDB    LENY
01520          STB     YCORD
01530          BRA     WHICH
01540
01550 UU       CMPA    #'U
01560          BNE     RR
01570          LDB     YCORD
01580          DECB
01590          ANDB    LENY
01600          STB     YCORD
01610          BRA     WHICH
01620
01630 RR       CMPA    #'R
01640          BNE     DD
01650          INC     XCORD
01660          LDA     XCORD
01670          CMPA    LENX
01680          BLS     RR1
01690          CLR     XCORD
01700          LDB     YCORD
01710          INCB
01720          ANDB    LENY
01730          STB     YCORD
01740 RR1      BRA     WHICH
01750
01760 DD       CMPA    #'D
01770          BNE     LL
01780          LDB     YCORD
01790          INCB
01800          ANDB    LENY
01810          STB     YCORD
01820          BRA     WHICH
01830
01840 LL       CMPA    #'L
01850          LBNE    PARSE   INCORRECT ENTRY
01860          DEC     XCORD
01870          LDA     XCORD
01880          BPL     LL1
01890          LDA     LENX
01900          STA     XCORD
01910          LDB     YCORD
01920          DECB
01930          ANDB    LENY
01940          STB     YCORD
01950 LL1      BRA     WHICH
01960
01970 WHICH    TST     COLOR   B/W OR COLOR?
01980          LBNE    CSHOW   Ø=B/W; 1=COLOR
01990
02000 SHOW     LDY     #ARRAY
02010          LDA     LENX
02020          INCA
02030          LDB     YCORD
02040          MUL
02050          ADDB    XCORD
02060          ADCA    #Ø      LOCATION=64*Y+X
02070          TST     D,Y     ZERO OR ONE?
02080          LBEQ    YES     IT'S ZERO
02090 NO       CLR     D,Y
02100          LDA     XCORD
02110          LSLA            2*XCORD
02120          STA     XX
02130          LDB     YCORD
02140          PSHS    B
02150          LSLB
02160          ADDB    ,S+     3*YCORD
02170          STB     YY
02180          PRESET  XX,YY   2*3 BLOCK
02190          INC     YY
02200          PRESET  XX,YY
02210          INC     YY
02220          PRESET  XX,YY
02230          INC     XX
02240          PRESET  XX,YY
02250          DEC     YY
02260          PRESET  XX,YY
02270          DEC     YY
02280          PRESET  XX,YY
02290          JSR     [$A000] ANY INPUT?
02300          LBEQ    P1
02310          RTS
02320
02330 YES      INC     D,Y
02340          LDA     XCORD
02350          LSLA
02360          STA     XX
02370          LDB     YCORD
02380          PSHS    B
02390          LSLB
02400          ADDB    ,S+
02410          STB     YY
```

```
02420           PSET    XX,YY
02430           INC     YY
02440           PSET    XX,YY
02450           INC     YY
02460           PSET    XX,YY
02470           INC     XX
02480           PSET    XX,YY
02490           DEC     YY
02500           PSET    XX,YY
02510           DEC     YY
02520           PSET    XX,YY
02530           JSR     [$A000]
02540           LBEQ    P1
02550           RTS
02560 CSHOW     LDY     #ARRAY  FOR COLOR
02570           LDA     LENX
02580           INCA
02590           LDB     YCORD
02600           MUL
02610           ADDB    XCORD
02620           ADCA    #0
02630           STD     LO
02640           LDA     D,Y
02650           DECA
02660           ANDA    #3
02670           LDB     #$55
02680           MUL
02690           STB     $B5     CURRENT COLOR
02700           LDA     XCORD
02710           LSLA
02720           STA     XX
02730           LDB     YCORD
02740           PSHS    B
02750           LSLB
02760           ADDB    ,S+
02770           STB     YY
02780           CPSET   XX,YY   2*3 BLOCK
02790           INC     YY
02800           CPSET   XX,YY
02810           INC     YY
02820           CPSET   XX,YY
02830           INC     XX
02840           CPSET   XX,YY
02850           DEC     YY
02860           CPSET   XX,YY
02870           DEC     YY
02880           CPSET   XX,YY
02890           LDD     LO
02900           LDY     #ARRAY
02910           LEAY    D,Y
02920           LDA     ,Y
02930           INCA
02940           ANDA    #3
02950           STA     ,Y
02960           JSR     [$A000]
02970           LBEQ    P1
02980           RTS
02990
03000 XCORD     RMB     1
03010 YCORD     RMB     1
03020 LENX      FCB     63
03030 LENY      FCB     31
03040 XX        RMB     1
03050 YY        RMB     1
03060 COLOR     RMB     1
03070 LO        RMB     2
03080 MOVE      RMB     256     YOU COULD INCREASE THIS
03090 ARRAY     RMB     1       STARTS HERE
03100           END     START
```


Deception Path A totally fun way to spend time with your family. Navigate the ever-shifting maze. 128K CoCo3 $19.95



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This time of year comes and goes so quickly. It's been a busy year for the CoCo, with new computers following in the footsteps of the CoCo 3. We hope you have a lot to be thankful for! Thanks for loving the CoCo, and for choosing products from Burke & Burke.

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Test your logic skills with an endless supply of puzzles

Logic Puzzler

by Kevin Speight

I have always found logic puzzles interesting and fun. But instead of buying more puzzle books, I decided to write a computer program to generate them. *Logic Puzzler* is the result, and it runs on any Color Computer with at least 16K.

Logic Puzzler creates puzzles that involve between three and six people, each having between one and four different characteristics. The goal of the puzzles is to determine which characteristics belong to which people. When you run the program a title screen appears, and you are asked how many people you want in the puzzle and how many characteristics each will have. Then *Logic Puzzler* goes to work and begins providing you with clues.

The clues given by the program are straightforward, with one exception: The "if" clues should be taken to mean "if and *only* if." That is, if one clue states "If Peter lives in Sydney then Igor owns a hamster," and other clues tell you that Peter doesn't live in Sydney, then you know that Igor doesn't own a hamster.

You can have up to 100 clues (more than you should need), and at any time during play you can see a list of the clues that have already been given. You can view these clues onscreen or print them. This is handy since some clues will be meaningless until you get more information.

When you are ready to solve the puzzle, press G . The computer then quizzes you to determine if you know the characters' characteristics.

Logic Puzzler creates random games, so you play a new game every time. Although many people enjoy logic puzzles, solving them is an especially good exercise in reasoning for younger people. Feel free to change the names and characteristics given in the DATA statements (lines 40 through 80) to better suit your child (or class). If you need to change the syntax of the sentence clues, edit the text in lines 530 through 600.

I hope you have fun with *Logic Puzzler*.❑

Kevin Speight is a university student who enjoys using his CoCo for programming and word processing. He can be contacted at Box 266, Howe Hall, Dalhousie University, Halifax, Nova Scotia, B3A 4J5. Please include an SASE when requesting a reply.

16K

The Listing: LOGIC

```
1 'LOGIC PUZZLE
2 'WRITTEN BY KEVIN SPEIGHT
3 'COPYRIGHT (C) JANUARY 1992
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 CLEAR5000:DIMEW$(100):CLS:PRI
NT@73,"logic puzzler":PRINT@200,
"BY KEVIN SPEIGHT":PRINT@425,"PR
ESS ANY KEY":GOSUB520:CLS:PRINT:
X=RND(-TIMER)
20 INPUT"HOW MANY PEOPLE WOULD Y
OU LIKE  TO HAVE IN THIS PUZZLE
(3-6)";N:IF N>6 OR N<3 THEN 20
30 PRINT:INPUT"HOW MANY CHARACTE
RISTICS SHALL  EACH PERSON HAVE
(1-4)";C:IF C>4 OR C<1 THEN 30
40 DATAJOHN,NANCY,CLAUDE,IGOR,SU
ZETTE,RAJIV,ROGER,JULIA,PETER,HE
LMUT,MARGARET,DON,ALEXA
```

```
50 DATACHICAGO,TORONTO,BANGOR,PH
OENIX,LAS VEGAS,PARIS,LONDON,MEM
PHIS,BONN,MOSCOW,DELHI,SYDNEY,RO
ME
60 DATAA CAT,A DOG,AN ELEPHANT,A
 CAMEL,A GOLDFISH,A PIGEON,AN OT
TER,A GERBIL,A HORSE,A HAMSTER,A
 BUDGIE,A SNAKE,A CHICKEN
70 DATABLUE,GREEN,RED,YELLOW,WHI
TE,ORANGE,BROWN,BLACK,PURPLE,GOL
D,SILVER,MAROON,GREY
80 DATAPIZZA,CHICKEN,HAMBURGERS,
STEAK,ESCARGOTS,PEA SOUP,POACHED
 EGGS,CAVIAR,FISH & CHIPS,EGG RO
LLS,GRITS,CRUMPETS,SALAD
90 PRINT:PRINT"RANDOMIZING...":D
=0:FORYY=1 TO N:FORZZ=1 TO C+1:R
ESTORE
100 IF DL>0 THEN FOR X=1TO DL:FO
R Y=1TO13:READX$:NEXTY:NEXTX
110 Y=RND(13):FORX=1TOY:READ Y$(
YY,ZZ):NEXTX:FORX=1TO YY:IF Y$(Y
Y,ZZ)=Y$(X,ZZ) AND X<>YY THEN RE
STORE:GOTO100 ELSE NEXT X
120 DL=DL+1:NEXTZZ:DL=0:NEXTYY
130 PRINT:PRINT"THE PEOPLE IN TH
IS PUZZLE ARE:":FORX=1TON:PRINTY
$(X,1),:NEXTX:PRINT:PRINT"FOR TH
E FIRST CLUE, PRESS A KEY":GOSUB
520:CLS:CL=0
140 CL=CL+1:PRINT"CLUE #"CL":"
150 X=RND(N):Y=RND(C)+1:X1=RND(N
):Y1=RND(C)+1:IFX=X1 OR(Y=Y1 AND
 C>1)THEN 150 ELSE Q=RND(8):ON Q
 GOTO 160,170,180,190,200,220,25
0,270
160 M$=M$+Y$(X,1):ON Y GOSUB,530
,550,570,590:M$=M$+Y$(X,Y):GOSUB
440:GOTO290
170 M$=M$+Y$(X,1):ON Y GOSUB,540
,560,580,600:M$=M$+Y$(X1,Y):GOSU
B440:GOTO290
180 IFC=1THEN150 ELSEM$=M$+"THE
PERSON WHO":ON Y GOSUB,530,550,5
90,590:M$=M$+Y$(X,Y):ON Y1 GOSUB
,530,550,590,590:M$=M$+Y$(X,Y1):
GOSUB440:GOTO290
190 IFC=1THEN150 ELSEM$=M$+"THE
PERSON WHO":ON Y GOSUB,530,550,5
90,590:M$=M$+Y$(X,Y)+" ISN'T THE
 ONE WHO":ON Y1 GOSUB,530,550,59
0,590:Y=Y1:X=X1:GOSUB240:M$=M$+X
$:GOSUB440:GOTO290
200 M$=M$+"EITHER "+Y$(X,1)+" OR
 "+Y$(X1,1):IF RND(2)=1THEN210 E
LSE ON Y GOSUB,530,550,570,590:M
$=M$+Y$(X,Y):GOSUB440:GOTO290
210 ON Y1 GOSUB,530,550,570,590:
M$=M$+Y$(X1,Y1):GOSUB440:GOTO290
220 M$=M$+Y$(X,1)+" EITHER":ON Y
 GOSUB,530,550,590,590:IFRND(2)=
1THEN230 ELSE M$=M$+Y$(X,Y)+" OR
 ":GOSUB240:M$=M$+X$:GOSUB440:GO
TO290
230 GOSUB240:M$=M$+X$+" OR "+Y$(
X,Y):GOSUB440:GOTO290
240 F=RND(N):IFF=X THEN240ELSEX$
=Y$(F,Y):RETURN
250 M$=M$+"IF "+Y$(X,1):ON Y GOS
UB,530,550,570,590:K=RND(2):IF K
=1THEN260 ELSEM$=M$+Y$(X,Y)+" TH
EN "+Y$(X1,1):ON Y1 GOSUB,530,55
0,570,590:M$=M$+Y$(X1,Y1):GOSUB4
40:GOTO290
260 GOSUB240:M$=M$+X$+" THEN "+Y
$(X1,1):ON Y1 GOSUB,530,550,570,
590:X=X1:Y=Y1:GOSUB240:M$=M$+X$:
GOSUB440:GOTO290
270 M$=M$+"IF "+Y$(X,1):ON Y GOS
UB,530,550,570,590:K=RND(2):IF K
=1THEN280ELSE M$=M$+Y$(X,Y)+" TH
EN "+Y$(X1,1):ON Y1 GOSUB,540,56
0,580,600:X=X1:Y=Y1:GOSUB240:M$=
M$+X$:GOSUB440:GOTO290
280 GOSUB240:M$=M$+X$+" THEN "+Y
$(X1,1):ON Y1 GOSUB,540,560,580,
600:M$=M$+Y$(X1,Y1):GOSUB440:GOT
O290
290 PRINT@320,"OPTIONS:":PRINT:P
RINT"(N)EXT CLUE","(Q)UIT","(G)U
ESS","(L)IST OF CLUES"
300 GOSUB520:IFX$="Q"THENCLS:END
 ELSEIFX$="N" AND CL<100 THENCLS
:GOTO140 ELSEIFX$="G"THEN310 ELS
EIFX$="L"THEN380ELSE300
310 CLS:PRINT"HERE'S YOUR CHANCE
 TO SOLVE THE PUZZLE.  WORKING..
.":PRINT:FORX=1TO C
320 FOR XD=1TO N:U(XD)=RND(N):FO
RXX=1TOXD-1:IFU(XX)=U(XD) ANDXD<
>1 THEN320 ELSE NEXTXX:NEXTXD
330 FORP=1TO N:PRINT@128,"WHICH
PERSON";:M$="":ON X+1 GOSUB,530,
550,570,590:PRINTM$:PRINTY$(U(P)
,X+1);"?":PRINT
340 FORT=1TO N:PRINT"("T") ";Y$(
T,1),:NEXTT
350 GOSUB520:XT=VAL(X$):IFXT<1OR
XT>N THEN350 ELSEIFXT=U(P)THENPR
INT:PRINT:PRINT"RIGHT!":FORXC=1T
O500:NEXTXC:CLS:NEXTP:NEXTX ELSE
 PRINT:PRINT:PRINT"WRONG.":FORXC
=1TO1000:NEXTXC:GOTO420
360 CLS:PRINT"YOU SOLVED THE PUZ
ZLE!!!"
370 PRINT:PRINT"PLAY AGAIN (Y/N)
?":GOSUB520:IFX$="Y"THEN RUN ELS
EPRINT:END
380 CLS:PRINT"PRINT CLUES TO (S)
CREEN OR      (P)RINTER":GOSUB52
0:IFX$="S"THEN390 ELSEIFX$="P"TH
EN 410 ELSE 380
390 CLS:TL=1
400 FORX=1TO4:M$=EW$(TL):GOSUB45
0:TL=TL+1:NEXTX:GOSUB520:CLS:IF
TL<CL THEN400 ELSE CLS:GOTO290
410 FORX=1TO CL:PRINT#-2,EW$(X):
NEXTX:CLS:GOTO290
420 CLS:PRINT"HERE IS THE SOLUTI
ON TO THE     PUZZLE:":PRINT
430 M$="":FORX=1TON:PRINT@64,"";
:FORY=1TO(C+1):M$=M$+Y$(X,Y)+" -
 ":NEXTY:GOSUB450:PRINT:PRINT"PR
ESS A KEY":GOSUB520:NEXTX:CLS:GO
TO370
440 IFCL<101THEN EW$(CL)=M$
450 PRINT:M$=M$+"    ":CX$=CHR$(3
2):LL=32:JK=INT(LEN(M$)/32):CR$=
RIGHT$(M$,JK):IFLEN(M$)<LL THEN5
10
460 IF MID$(M$,LL,1)=CX$ THEN510
470 FOR CX=LL TO 1STEP-1:IFMID$(
M$,CX,1)=CX$ THEN CC=CX:GOTO490
480 NEXT CX:GOTO510
490 PRINT LEFT$(M$,CC-1):M$=MID$
(M$,CC+1,LEN(M$)-CC-1)
500 IF LEN(M$)>32 THEN470
510 PRINT M$:M$="":RETURN
520 X$=INKEY$:IFX$=""THEN520ELSE
RETURN
530 M$=M$+" LIVES IN ":RETURN
540 M$=M$+" DOESN'T LIVE IN ":RE
TURN
550 M$=M$+" OWNS ":RETURN
560 M$=M$+" DOESN'T OWN ":RETURN
570 M$=M$+"'S FAVORITE COLOR IS
":RETURN
580 M$=M$+"'S FAVORITE COLOR ISN
'T ":RETURN
590 M$=M$+" LIKES ":RETURN
600 M$=M$+" DOESN'T LIKE ":RETUR
N
```


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Modem Pak Addressing

by Marty Goodman
Contributing Editor

Q Can you refresh my memory on the port address of an (unmodified) Direct-Connect Modem Pak?

Rick Adams (RICKADAMS)
Rhonert Part, California

A The Direct-Connect Modem Pak's 6551 UART is addressed at $FF6C through $FF6F. This is in contrast to the Radio Shack RS-232 Pak, in which 6551 UART is addressed at $FF68 through $FF6B.

Substituting EPROMs

Q Can I put a 28-pin EPROM in a Radio Shack disk controller that has a 24-pin ROM socket in it?

Ted Jaeger (TEDJAEGER)
Fulton, Missouri

A No, not without some modifications or adapters. Almost all 28-pin EPROMs for the CoCo are of the 2764 or 27128 variety. These require rewiring of a couple of address and power lines in order to connect properly to the 24-pin ROM socket in Radio Shack disk controllers issued prior to the FD-502 controller. Art Flexser of Spectro-Systems sells an adapter that does the job of adapting a 28-pin 2764 or 27128 for a disk controller that has a 24-pin ROM in it. I have used these and recommend them. I have also made the adaptation myself by desoldering the old socket, cutting some traces and adding jumpers. The home-brew adaptation I made looked a little nicer than Art's adapter, but was a great deal of trouble and rather time consuming.

Motorola used to make a 68766 EPROM that is pin-for-pin compatible with the 24-pin ROM socket in older Radio Shack disk controllers. These have not been made for years, but some suppliers still carry them. The 68766 is several times more expensive than the cheap and widely available 2764 and 27128 EPROMs. Texas Instruments also used to make a 28-pin 2564 EPROM. This variant 28-pin EPROM could be made to fit into a 24-pin 8K ROM socket (with the outer four pins overhanging the socket) with only a jumper or two on top of the chip. The 2564, however, has also been discontinued and is even harder to find than the 68766. If you have any 2564 chips lying around (and the means to program them), all you do after programing them is short pins 1, 24 and 28 together, and short pins 2, 14 and 27 together. This pulls Vpp and Vcc high, and pulls *CS1 and *CS2 low. Then put the chip into the 24-pin ROM socket with pins 1, 2, 27, and 28 overhanging the socket. Note, too, that on some Radio Shack controllers there are two socketed 24-pin chips. Only one of these is the ROM chip. The other chip, a Western Digital WD1773, is the disk controller chip. Do not attempt to replace that chip with an EPROM!

Using Digital RGB Monitors

Q I have a vintage 1982 NEC RGB color monitor. It has an odd-shaped connector on it (not a DB-9) and a positive/negative sync switch. How do I make a cable to connect it to a Color Computer? Where do I find the required connectors?

Edward L. Krause (BIRTHDAYBOY)
Santa Cruz, California

A Given your description and the vintage of the monitor, I speculate your monitor has a rectangular eight-pin connector on it. This was once a standard for CGA-type RGB monitors, although it also was used for pre-CGA digital RGB monitors that could display only eight colors (they lacked an intensity line). Looking at the business end of the male connector, the pin-out is as follows:

Gnd	I
Gnd	red
H	green
V	blue

where I is intensity, H is horizontal sync and V is vertical sync.

As you may know, you can hook a CGA monitor to a CoCo 3 by hooking all like-named pins together and ignoring the intensity line. This will get you six colors plus black and white in most cases, but not the full 64 colors that the CoCo 3 is capable of displaying. For 64 colors you have to get inside the monitor and make modifications to remove the digital input circuity and provide an analog input. Use the positive sync selection for the sync inputs. The 10-pin IDC female connector needed to make a cable that plugs into the CoCo 3 is available from Jameco in Belmont, California, but that company has a $50 minimum per order. It also is available from JDR in San Jose, California. JDR has not yet to my knowledge instituted a minimum order, although they charge handsomely for ship-

---

Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

ping and handling on small orders. Delphi members should note that I have lots of spare 10-pin IDC female RGB connectors, and I will happily arrange to get you one cheaply if you contact me via Delphi mail.

Finding the Right Pin

Q *How can I find Pin 37 on my disk controller's 40-pin edge connector so I can properly connect my SpectroSystems 28-to-24-pin EPROM adapter? How can I get at the data in* Rad Warrior *and* Robocop *to use with the programs from Delphi that allow me to put those ROM packs on disk?*

George Quellhorst
Painesville, Ohio

A Hold the disk controller so that you are looking down on the component side of the controller circuit board, with the 40-pin edge connector pointing away from you and the 34-pin (disk-cable) edge connector toward your chest. The traces on the component side of the 40-pin edge connector are all odd numbered. Pin 1 is at the extreme right, and Pin 39 at the extreme left.

Both *Rad Warrior* and *Robocop* have memory-manager circuits. I actually consulted with Epyx on the design of the memory manager for *Rad Warrior*. With *Rad Warrior*, setting Bit 0 at $FF40 selects between one of two 16K banks in the 32K byte ROM that it uses. That is, `POKE &HFF40,1` selects the lower bank and `POKE &HFF40,2` selects the upper bank. *Robocop* also uses a bank selector, but it has (if I remember correctly) four 32K banks that can be selected. The lower two data bits in *Robocop* control bank selection, selecting between those four banks. Thus poking 0, 1, 2 or 4 into $FF40 selects different banks of this ROM pak. *Robocop* is interesting, by the way, in that it uses a 1-megabit (128K-byte) ROM, which is four times larger than any other ROM pak commercially produced for the Color Computer. For more information about higher-capacity ROM paks, see "Breaking the 32K Barrier" (June 1990, Page 58) by Greg Zumwalt.

ROM Paks and Multi-Paks

Q *What are the limitations on the size of a ROM pak that you can use with the Color Computer? How many different types of Multi-Paks were made by Radio Shack for the Color Computer? Were any made specifically for the CoCo 3? How can I tell if a Multi-Pak has been upgraded for a CoCo 3? Can I use an RS-232 pak in some slot other than Slot 1 of the Multi-Pak?*

Charles Pelosie (CPELOSIE)
Piscataway, New Jersey

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❑ Third Adventure Package with Tape	~~$21.90~~	$11.95	_____
❑ Third Adventure Package with Disk	~~$26.90~~	$12.95	_____
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A The CoCo 1 and 2 can directly address nearly 16K bytes of ROM data (actually 16K less 256 bytes). The CoCo 3 is designed so it can directly address up to a full 32K bytes of ROM data (though to get the final 512 bytes you have to do some rather sneaky manipulation of the memory management unit in the GIME chip). However, if you add simple bank-select circuitry to the ROM pak (as was done with *Robocop*), you can arrange for any CoCo to address virtually any amount of ROM data. For example, a bank-select circuit consisting of two 30-cent TTL logic chips can be used to allow a CoCo 3 to address a full 512K bytes of ROM. With sightly more complex bank-select circuits, many megabytes of ROM data can be addressed.

Only two types of Multi-Pak Interfaces were made by Tandy for the Color Computer: Cat. No. 26-3024 and Cat. No. 26-3124. No Multi-Paks were made specifically for the CoCo 3. Both the 26-3024 and the 26-3124 Multi-Paks require upgrades to work properly with a CoCo 3. What is confusing is that the 26-3024 was issued first in a gray plastic case, then later in a white plastic case. The circuit boards inside these cases, however, are identical. The gray-case version tended to be supplied with an older revision of the PAL chip that literally prevented them from working with a CoCo 3 when the disk controller was in Slot 4. The PAL in the white-case version usually allows them to *appear* to work with a CoCo 3, although these white-case models still require an upgrade for proper, reliable operation.

If you have the newer, smaller 26-3124 Multi-Pak, just look inside it to see if a satellite circuit board has been added. If so, it has been upgraded. Otherwise you need to upgrade the unit before using it with a CoCo 3. We have posted the instructions on Delphi for making and installing an upgrade board).

It is somewhat more difficult to tell if the 26-3024 Multi-Pak has been upgraded. There is one socketed 20-pin chip, the PAL chip, on the motherboard. Tandy originally supplied these Multi-Paks with a 14L4 PAL chip. When Tandy issued the upgrad PALs to allow operation with the CoCo 3, they used Synertec PLHS18P8 PAL chips with brown paper dots stuck to them. (Any PALs I have supplied to CoCo PRO! have a sticker indicating they are for use with the CoCo 3.) A PAL chip is like an EPROM in that chips with the same part number can be burned with different internal data. I have uploaded to Delphi the logic equations and fuse maps for burning 14L4 and 16V8 PALs to upgrade the 26-3024 Multi-Pak for the CoCo 3. These can be found in the Hardware Hacking section of the CoCo SIG database.

Most Disk BASIC programs do not care which Multi-Pak slot the RS-232 Pak is in. *Ultimaterm* and *Coterm* are exceptions because they make use of the *CART interrupt, which is slot dependent. All OS-9 software cares very much which slot the RS-232 Pak is in because OS-9 drivers always require use of the *CART interrupt. Note that most programs that use the *CART interrupt have a means of telling the program to look for the RS-232 Pak in a different slot. Alternatively, you can strap the interrupt pins on your Multi-Pak (short together all the Pin 8's of the 40-pin connectors), as most OS-9 users do. If you do this, it will not matter at all in which slot you put the RS-232 Pak, even with OS-9. Strapping the interrupt lines on the Multi-Pak can also eliminate certain sources of intermittent crashes and lost characters when using serial communications with OS-9.

Soundless CoCo

Q *The sound on my CoCo 3 has failed. The problem is in the CoCo 3, not my CM-8 — when I hook a different CoCo 3 to the CM-8, I get sound. I have a Tandy service manual for the CoCo 3, but lack the equipment needed to diagnose the problem. Can you advise me about what chip is most likely to be the cause?*

Ralph W. Brown
Buffalo Grove, Illinois

A If you have the service manual for the CoCo 3, you have the schematic diagram for the CoCo 3. The sound circuit for the CoCo 3 is quite linear, and so rather trivial to check out. Although an oscilloscope is handy, a simple VOM and a Radio Shack speaker/amplifier (Radio Shack Cat. No. 277-1008) is really all you need. Use the speaker/amplifier as an audio signal tracer, with ground hooked to the ground on the CoCo, and the signal-in pin as the signal tracer probe. Or you can actually use the CM-8's speaker the same way if you stick some wires into its 10-pin connector. Just remember that pins 1 and 2 of the CM-8's connector are ground and Pin 7 is the audio input. Now write a one-line BASIC program that produces a steady tone, such as `10 SOUND 100,10:GOTO 100` and run it.

Connect the audio input to the audio output jack on the CoCo. If you get sound, there is a problem with the trace that connects Pin 7 of the RGB connector to the audio output RCA jack. Restore that trace with a jumper wire. If you don't get sound, check the emitter of Transistor Q7. The fault could still lie in IC4 (the 68B21 PIA), but an isolated sound problem caused by the PIA chip is rather unusual. Check Pin 11 of IC4 for the presence of sound.

Note that if you do not know how to use a VOM and an audio signal tracer, you would do best to turn this repair over to someone who does. Scatter-shot replacement of components and chips is not usually a wise or productive approach to electronic repair. Indeed, in some cases no components are bad, and instead the problem is a broken trace or a cold solder joint. In that case, replacement of components results in replacing one good component with another. This is a waste of time and money, and risks further damage to the computer.

RS-232 Pak Upgrades

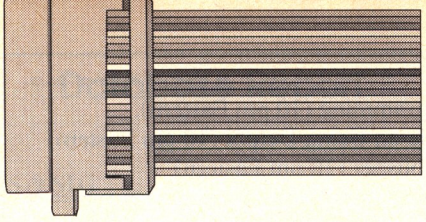
Q *Do I need to change the crystal in a Radio Shack RS-232 Pak or modify it in any other way to allow it to operate properly with a CoCo 3?*

Allen Bourdon (BOURDON)
Dallas, Texas

A No. Most Radio Shack RS-232 Paks work fine off the shelf with no modifications when used with a 2-MHz CoCo 3. On very rare occasions the RS-232 Pak's 6551 chip, which is rated for operation at no faster than 1MHz, will have trouble working with a 2-MHz CoCo 3. The symptom is occasional lockups or lost characters when using telecommunication programs, especially with OS-9. If you suspect such a problem, remove the 6551 and replace it with a 6551A, which is rated by the manufacturer to operate up through 2-MHz bus-cycle speeds. Note that the bus-cycle speed at which the 6551 operates has absolutely nothing to do with the baud, which is controlled by a separate 1.8432-MHz crystal in the RS-232 Pak.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P. O. Box 385, Prospect, KY 40059. We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services. Then at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form, which has complete instructions.



Editing Submissions II

by Eddie Kuns
OS-9 SIG Database Manager

Last month we covered several of the easier (and more commonly used) editing commands. Let's jump right back into editing the submission. Before executing any of these commands, of course, you must be at the EDIT> prompt. I'll start with one of the more esoteric commands — one rarely used, but very useful:

```
EDIT> rearrange
Which item (? for list): ?

  1  AR BINARY (Size: 13312 Count:
437)
  2  AR DOCUMENTATION (Size: 5732
Count: 360)
  3  AR SOURCE (Size: 14592 Count:
189)
Which item (? for list): 3
After which item (? for list, 0 for
beginning): 0
```

Here I moved the third item (AR SOURCE) to the top so that it appears first in the file-description listing.

```
EDIT> rearrange
Which item (? for list): ?

  1  AR SOURCE (Size: 14592 Count:
189)
  2  AR BINARY (Size: 13312 Count:
437)
  3  AR DOCUMENTATION (Size: 5732
Count: 360)
Which item (? for list): 1
After which item (? for list, 0 for
beginning): 3
```

I then changed my mind and moved it back to its original location. Notice that the files are renumbered starting at 1 each time you rearrange items. The REARRANGE command is often useful when you batch upload several files that arrive in ASCII order, not numerical order. For example, if you batch upload FILE1.TXT through FILE15.TXT, the files may arrive in the order FILE1.TXT, FILE11.TXT, FILE15.TXT, FILE2.TXT, FILE9.TXT, etc. Several rearrange commands can fix the order of the files so they appear in a more logical order. Now I've decided to add another file to the group.

```
EDIT> copy
Item edit cleanup. Please wait.

You have uploaded the following so
far:
  1 AR BINARY (Size: 13312)
  2 AR DOCUMENTATION (Size: 5732)
  3 AR SOURCE (Size: 14592)

Database Submit Menu:

Choose Upload Protocol
Upload File 4
Batch Upload Files
Review-edit Group
Copy File 4 from Workspace
Help
Exit

SUBMIT>
```

The COPY command in the Edit menu brings you to the Database Submit menu. The UPLOAD command does the same thing. You can now upload or copy a new file from this menu.

```
SUBMIT> copy

Workspace filename for file 4:
new_file.txt
Delete the file during the submit?
(Y/N) no
Download Filename: new_file.txt
Title: new file for demonstration
Copying "NEW_FILE.TXT".
```

When you have no more files to submit, press CTRL-Z. Enter a question mark (?) if you need assistance.

```
Workspace filename for file 5: ^Z
```

I just copied an additional file into the group from my workspace. Follow a similiar sequence of events to upload a new file rather than copy it from your workspace. This was the only additional file I wanted to upload, so I pressed CTRL-Z. But I do want to review (and/or edit) the group to make sure everything is OK.

```
SUBMIT> review

Name: AR V1.3: FILE ARCHIVING UTILITY
Type: PROGRAM
Date: 9-OCT-1990 22:07 by DODGECOLT

A new version of the popular AR
archiving utility. Completely com-
patible with previous versions. This
version now stores file attributes.

Topic: Applications (6809)

Keywords: ARCHIVERS, DODGECOLT, AR
```

Eddie Kuns is pursuing a doctorate in physics at Rutgers University. He lives in Aurora, Illinois, and works as a programmer and researcher at Fermilab. Eddie is the OS9 Online database manager; his username is EDDIEKUNS.

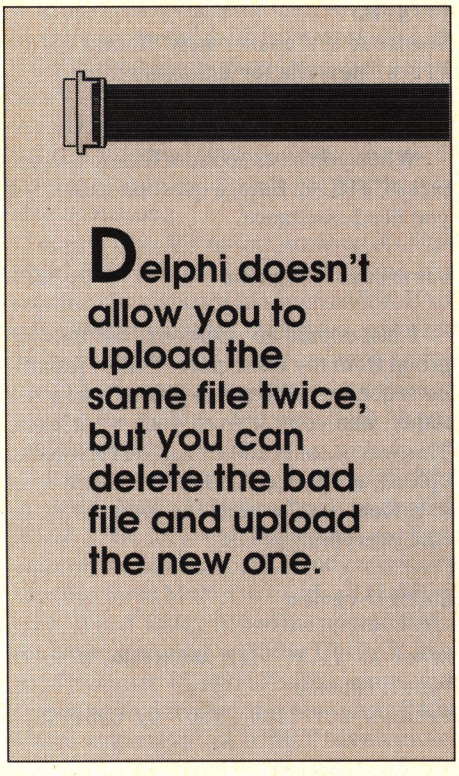
```
Contents:

  1  AR BINARY (Size: 13312 Count:
437)
  2  AR DOCUMENTATION (Size: 5732
Count: 360)
  3  AR SOURCE (Size: 14592 Count:
189)
  4   NEW FILE FOR DEMONSTRATION
(Size: 114 Count: 0)
```

Remember that REVIEW displays the group in its current state, and takes you back to the Edit menu.

```
EDIT> delete 4
  4   NEW FILE FOR DEMONSTRATION
(Size: 114 Count: 0)
Delete this item?(y/n) yes
```

Here I changed my mind again and decided to delete the new file. If you had trouble uploading a file, use this command to remove the offending item; Delphi doesn't allow you to upload the same file twice, but you can delete the bad file and upload the new one. If you accidentally delete the wrong file, you must upload it again. Before you delete a file, it is a good idea to use REVIEW or SHOW * to make sure



you delete the correct item. If you don't supply an item number on the command line, Delphi prompts you for the item number. You can type ? at this prompt to see your choices.

```
EDIT> erase
Erase all download names? no
```

```
-=-=-=
```

Database Report

OS-9 SIG

General Information

WINDOW WRITER KEY LISTS
BOBKEMPER Robert Kemper
OS9 COMMUNITY NETWORK
OSK GFX STANDARDS SUGGESTION
DONVAIL Don Vaillancourt

Applications (6809)

FIX CLEANUP
BOBKEMPER Robert Kemper
THREE D X-WINDOW DEMO
REVWCP Br. Jeremy, CSJW
SETDFP: SET DEFAULT PALETTES
MIKEHAN Mike Hanewinckel
AC: FIND LOCATION FROM AREA CODE
JOELHEGBERG Joel Mathew Hegberg
DISKCOPY: ONE STEP "DSAVE"
DKINDBERG Darren Kindberg
BANNER MAKER 2.0
ESCHULMAN Erich Schulman
CALENDER:UNIX-LIKE CAL. UTILS
CHYDE Chris Hyde
JBUDGET 2.0
DISKNAME:CHANGE DISK VOLUME NAME
JIMBM Jim Manning
EASYBACK BACKUP UTIL.
TIMLTAYLOR Tim Tailor
JOVE FORMATTED DOCS
07ESRTIMOTHY Tim Fadden

Graphics & Music

EPYX GAMES FOR MULTIVUE
DKINDBERG Darren Kindberg
PAC2OS9: PACMAN GAME V2
LARRYOLSON Larry Olson
VIEW 4.4
TIMKIENTZLE Tim Kientzle

Programmers Den

EMULATE_6809
JBUCATA Jason Bucata

68K-OS9

OSK UTILS
PAGAN Stephen Carville
CD TEST PROGRAM, OSK SERIAL DRIV
MM1 UTILITIES PAK #1 FROM STG
TREVNICK Scott Griepentrog
AR V1.3 ARCHIVER
RANDYKWILSON Randy Wilson
EFFO PD SOFTWARE LISTING
POLTERGEIST Brian Wright
GNU C COMPILER
EMTWO Paul M. Fitch Jr.

CoCo SIG

CoCo 3 Graphics

DUCK
FLAMINGO
SADDAM HUSSEIN
DRILLMASTER Johnny Williams
640X200X4 GIFS
STEVEPDX Steve Ricketts
HSCREEN 3 ANTHRAX LOGO
MACJUNIOR Jay McGraw
A BLONDE
AUNT
TRAS Richard P. Trasborg
ASSORTED SINGLE IMG SCANS #1
COLORIZ2.IMG
LLEMMART Michael Trammell
FULL LENGTH SHOT OF SAMANTHA FOX
BOYNGER David Boynton
PLANES IN CM3 FORMAT
RICKMAC Richard McNabb

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18. TRANSPIX Transfer your PMODE 4 pictures to HSCREEN 2.	19. COLPRINT Print your HSCREEN 2 pictures in color with your NX STAR 1000. NO MORE MIXING COLORS. Uses built-in table for easy use.	20. PALSAVER Use with your VUMASTER (popular public domain graphics viewer) to save and restore palettes after RESET.

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Novices Niche

Sine Lines 3
by Mikel Voss

CoCo 3

While transferring files between my many disks, I came across a cute quickie from the past. *Sine Lines* originally appeared in the October 1983 issue of THE RAINBOW (Page 80). After watching the program run for a few minutes, I began to wonder why nobody had rewritten it to take advantage of the CoCo 3's graphics screens. I decided to take the bull by the horns. *Sine Lines 3* is my version of this pretty graphics program, and it provides some colorful twists not available in the original. I hope you enjoy it.

The Listing: SINLINE3

```
1 'SINE LINES 3
2 'BY MIKEL VOSS
3 'COPYRIGHT (C) JANUARY 1992
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 PALETTE RGB:POKE 65497,0:HSCR
EEN2:HCLS2:ON BRK GOTO110
20 B=B+I:S=S+.1:D=D+Q
30 Z=RND(8):IF Z=2 THEN 30
40 IF B>250 THEN HCLS2:I=-2:HCOL
OR Z
50 IF D>180 THEN Q=-2
60 IF D<5 THEN Q=2
70 IF B<5 THEN I=2
80 X=(SIN(S)*160)+160
90 HLINE (X,D)-(D,B),PSET
100 GOTO20
110 POKE 65496,0:CLS:END
```

CoCo Hangman
by John Saya

CoCo 3

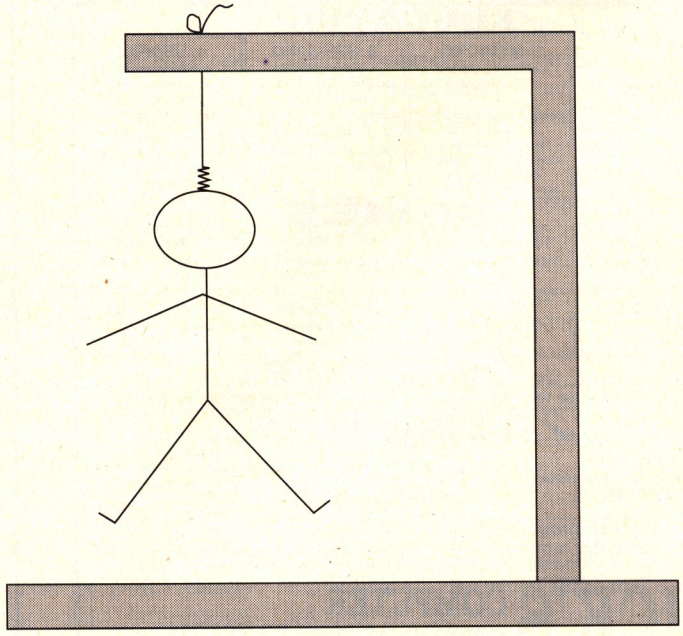
CoCo Hangman is a one-player (you play against the computer) game in which you try to guess a phrase the computer picks. This computerized version of the popular game for youngsters is designed for the CoCo 3.

When you run the program, a gallows appears on the right side of the screen. Below the gallows are several dashes indicating how many words are used in the phrase and how many letters are used in each word. By pressing a key, you can pick a letter from the alphabet that you think might appear in the phrase. If you are successful, the letter is shown wherever it occurs in the hidden phrase. However, if you pick a letter that is not in the phrase, the computer draws a part of a person hanging from the gallows. Keep trying letters until you have guessed the phrase (in which case you win) or the computer has drawn a complete body (you lose). When you win a game, the screen clears and the computer picks a new phrase.

The body the computer draws for incorrect guesses is a stick figure consisting of a head, a torso, two legs and two arms — you get six wrong answers before you lose. On the lower left portion of the screen is a box that shows the incorrect letters you have picked. Multiple attempts with an incorrect letter count as another wrong guess, resulting in another body part being drawn. The phrases the computer chooses are contained in variables A$(1) through A$(25) and are defined in lines 60 through 300. Feel free to change them to suit your needs.

The Listing: COCOHANG

```
1 'COCO HANGMAN
2 'BY JOHN SAYA
3 'COPYRIGHT (C) JANUARY 1992
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
40 POKE&HE414,0:POKE&HE42A,0
50 POKE65497,0:CLEAR1000:DIMA$(2
5)
60 A$(1)="FLOWER BASKET"
70 A$(2)="GINGER BREAD"
80 A$(3)="MERRY CHRISTMAS"
90 A$(4)="BACON AND EGGS"
100 A$(5)="TOASTED MARSHMALLOWS"
110 A$(6)="ORANGE JUICE"
120 A$(7)="BAKED CHICKEN"
130 A$(8)="FRUIT AND SALAD"
140 A$(9)="BREAD CRUMBS"
150 A$(10)="PAPER DOLLS"
160 A$(11)="COLOR COMPUTER"
170 A$(12)="CORN BREAD"
180 A$(13)="HEALTHY SNACKS"
190 A$(14)="OLIVE OIL"
200 A$(15)="SOUR GRAPES"
210 A$(16)="DISK DRIVE"
220 A$(17)="CORN FLAKES"
230 A$(18)="WHOLE WHEAT BREAD"
240 A$(19)="CARAMEL SWEETS"
250 A$(20)="MEAT AND VEGETABLES"
260 A$(21)="CORN SYRUP"
270 A$(22)="PEANUT BUTTER AND JE
LLY"
280 A$(23)="SUB SANDWICH"
290 A$(24)="LOLLI POP"
```



```
300 A$(25)="SLOPPY JOE"
310 PALETTE CMP
320 HSCREEN2:O=14:I=0:J=0:A$="":
B$="":V$=""
330 PALETTE0,0:PALETTE1,63:PALET
TE2,18:PALETTE3,36:PALETTE4,11:P
ALETTE5,7:PALETTE6,31:PALETTE7,9
:PALETTE8,38:HCLS 1
340 HCOLOR7,7:HPRINT(15,0),">>>
COCO HANG MAN <<<"
350 HCOLOR0,0:HLINE(96,0)-(96,19
1),PSET
360 HCOLOR0,0:HLINE(96,88)-(0,88
),PSET
370 HCOLOR5,5:HPRINT(1,0),"* TRI
ES *"
380 HCOLOR4,4:HPRINT(1,12),"* WR
ONG *"
390 HCOLOR0,0:HLINE(96,9)-(0,9),
PSET
400 HCOLOR0,0:HLINE(96,104)-(0,1
04),PSET
410 HCOLOR0,0:HLINE(96,94)-(0,94
),PSET
420 HPAINT(0,89),2,0
430 HCOLOR0,0:HLINE(241,26)-(241
,11),PSET
440 HCOLOR0,0:HLINE(241,26)-(229
,26),PSET
450 HCOLOR0,0:HLINE(229,26)-(229
,17),PSET
460 HCOLOR0,0:HLINE(241,11)-(135
,11),PSET
470 HCOLOR0,0:HLINE(229,17)-(144
,17),PSET
480 HCOLOR0,0:HLINE(135,11)-(135
,167),PSET
490 HCOLOR0,0:HLINE(144,17)-(144
,167),PSET
500 HCOLOR0,0:HLINE(106,167)-(17
2,177),PSET,B
510 HPAINT(240,25),5,0
520 HPAINT(107,168),4,0
530 A=RND(25):A$=A$(A):X=LEN(A$)
540 FORZ=1TOX:IF MID$(A$,Z,1)="
" THEN B$=B$+" ":NEXTZ ELSE B$=B
$+"-":NEXTZ
550 HCOLOR0,0:HPRINT(13,24),B$
560 X$=INKEY$:IFX$=""THEN560
570 FORZ=1TOX:IF MID$(A$,Z,1)=X$
 THEN 580 ELSE NEXTZ:GOTO590
580 H=13:FORZ=1TOX:IF MID$(A$,Z,
1)=X$ THEN MID$(B$,Z,1)=MID$(A$,
Z,1):HCOLOR1,1:HPRINT(H,24),"-":
HCOLOR2,2:HPRINT(H,24),X$:H=H+1:
NEXTZ:PLAY"T8O3ADBFCBGA":IF B$=A
$ THEN 660 ELSE 700 ELSE H=H+1:N
EXTZ:PLAY"T8O3ADBFCBGA":IF B$=A$
 THEN 660 ELSE 700
590 HCOLOR0,0:HPRINT(J,0),X$:J=J
+1:GOSUB600:I=I+1:IF I=6 THEN 67
0 ELSE PLAY"T5O4BO3BO2BT101B":IF
 J=11 THEN J=0:O=O+1:GOTO700 ELS
E 700
600 IF I=0 THEN HCOLOR0,0:HCIRCL
E(235,54),29:RETURN
610 IF I=1 THEN HCOLOR0,0:HLINE(
236,80)-(236,133),PSET:RETURN
620 IF I=2 THEN HCOLOR0,0:HLINE(
236,133)-(208,157),PSET:RETURN
630 IF I=3 THEN HCOLOR0,0:HLINE(
236,133)-(257,157),PSET:RETURN
640 IF I=4 THEN HCOLOR0,0:HLINE(
236,96)-(210,83),PSET:RETURN
650 IF I=5 THEN HCOLOR0,0:HLINE(
236,96)-(260,83),PSET:RETURN
660 HCOLOR5,5:HPRINT(19,3),"TERR
IFIC":SOUND175,25:HCLS1:T=T+1:GO
TO60
670 HCOLOR0,0:HPRINT(19,3),"HANG
 MAN":SOUND100,25:HCLS1:HCOLOR5,
5:HPRINT(5,5),"YOU WON":HPRINT(1
2,5),T:HPRINT(18,5),"GAMES !!!":
HCOLOR0,0:HPRINT(10,10),"PLAY AG
AIN?"
680 V$=INKEY$:IFV$=""THEN680
690 IF V$="Y" THEN 50 ELSE WIDTH
32:CMP:CLS:POKE65496,0:POKE&HE41
4,3:POKE&HE42A,3:POKE113,0:EXEC4
0999
700 HCOLOR1,1:HPRINT(4,5),K:K=K+
1:HCOLOR0,0:HPRINT(4,5),K:GOTO56
0
```

Pre-fab Arkitekt

by Keiran Kenny

16K Extended

Arkitekt allows you to design simple graphic images using four basic building blocks: a pair of pillars, a solid block, a spire and a dome. When you run the program, a menu showing the four building blocks appears at the top of the screen. Next to one of the blocks is a diamond-shaped cursor. Select a building block by using the arrows to position the cursor and pressing ENTER. The block appears in the drawing area and can be moved with the arrow keys; the blocks are moved in eight-pixel increments. Once you have placed the block where you want it, press ENTER to set it. Otherwise press CLEAR to erase it. Press any key to return to the menu and select another block.

If you move a block over an existing design, the path over which the block moves is erased. You can use this to create special effects, such as openings in solid walls. Keep this in mind, but also remember that you can rebuild erased structures.

When you are finished drawing, return to the menu and press S to save the image. Enter an appropriate filename with eight or fewer characters and the image is saved to disk (if you have a disk drive) or tape. *Arkitekt* automatically defaults to the disk drive if both are connected. To load a picture, press L at the menu and enter the filename. After saving or loading an image, press any key to return to the menu.

The four blocks are drawn in 32-by-32-pixel frames and are stored in arrays named C through F in lines 60 and 80 through 100. In Line 40 an area of blank screen (for use as an eraser) is stored in Array G.

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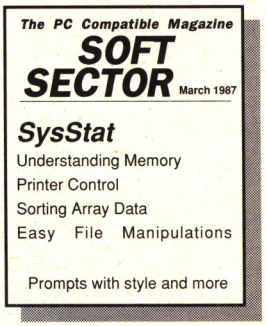

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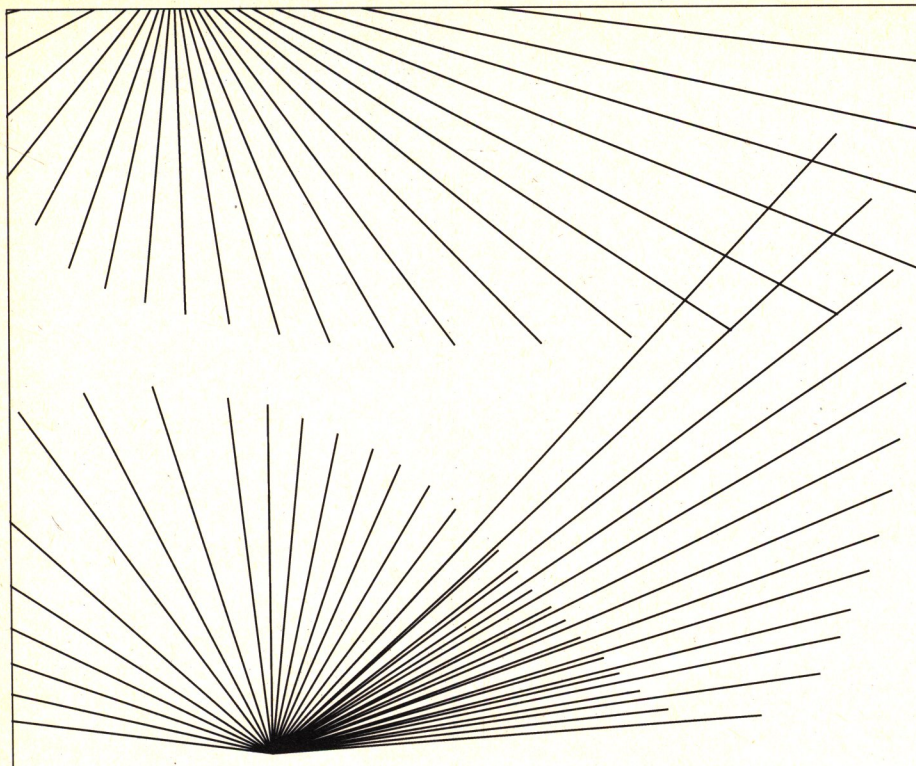

The Listing: ARKITEKT

```
1 'ARKITEKT
2 'BY KEIRAN KENNY
3 'COPYRIGHT (C) JANUARY 1992
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 DIMA(3),B(3),C(38),D(38),E(38
),F(13),G(38)
20 D$="F3G3H3E3":PK=PEEK(&H15F)
30 PMODE4,1:COLOR0,5:PCLS:SCREEN
1,1
40 GET(0,0)-(31,31),G
50 GET(0,0)-(5,6),B
60 DRAW"BM16,31U31R5D31NL5BR21U3
1R5D31NL5":PAINT(18,30),0,0:PAIN
T(44,30),0,0:GET(16,0)-(47,47),C
70 DRAW"BM56,16"+D$:PAINT(56,18)
,0,0:GET(53,16)-(59,23),A,G
80 LINE(80,0)-(111,31),PSET,BF:G
ET(80,0)-(111,31),D
90 DRAW"BM144,31NR31M+15,-31M+16
,+31":PAINT(160,30),0,0:GET(144,
0)-(175,31),E
100 CIRCLE(224,15),16,,1,.5,1:CI
RCLE(224,15),10,,1,.5,1:LINE(209
,15)-(214,15),PSET:LINE(234,15)-
(239,15),PSET:PAINT(235,14),0,0:
GET(208,0)-(239,15),F
110 FORX=0TO256STEP64:LINE(X,0)-
(X,31),PSET:NEXT
120 ST=53:N=1
130 K$=INKEY$:IFK$<>CHR$(8)ANDK$
<>CHR$(9)ANDK$<>CHR$(13)ANDK$<>"
S"ANDK$<>"L"THEN130
140 IFK$="L"THEN490
150 IFK$="S"THEN450
160 IFK$=CHR$(13)THEN240
170 IFK$=CHR$(9)THENST=ST+64:GOT
0180ELSE200
180 IFST>245THENST=245:GOTO230
190 PUT(ST-64,16)-(ST-58,23),B,P
SET:PUT(ST,16)-(ST+6,23),A,PSET:
N=N+1:GOTO230
200 IFK$=CHR$(8)THENST=ST-64
210 IFST<53THENST=53:GOTO230
220 PUT(ST+64,16)-(ST+70,23),B,P
SET:PUT(ST,16)-(ST+6,23),A,PSET:
N=N-1
230 GOTO130
240 X=112:Y=32
250 IFN=4THENPUT(X,Y)-(X+31,Y+15
),G ELSEPUT(X,Y)-(X+31,Y+31),G,P
SET
260 IFN=4THENLL=176ELSELL=160
270 IFPEEK(341)=247THENY=Y-8
280 IFPEEK(342)=247THENY=Y+8
290 IFPEEK(343)=247THENX=X-8
300 IFPEEK(344)=247THENX=X+8
310 IFX<0THENX=0
320 IFX>224THENX=224
330 IFY<32THENY=32
340 IFY>LL THENY=LL
350 IFN=1THENPUT(X,Y)-(X+31,Y+31
),C
360 IFN=2THENPUT(X,Y)-(X+31,Y+31
),D
370 IFN=3THENPUT(X,Y)-(X+31,Y+31
),E
380 IFN=4THENPUT(X,Y)-(X+31,Y+15
),F
390 IFINKEY$=CHR$(13)THEN410
400 GOTO250
410 K$=INKEY$:IFK$=""THEN410
420 IFK$=CHR$(12)ANDN<4THENPUT(X
,Y)-(X+31,Y+31),G ELSEIFK$=CHR$(
12)ANDN=4THENPUT(X,Y)-(X+31,Y+16
),G
430 PUT(ST,16)-(ST+6,23),B,PSET:
PUT(53,16)-(59,23),A,PSET
440 GOTO120
450 K$=INKEY$:FORT=0TO224STEP32:
PUT(T,0)-(T+31,31),G:NEXT:CLS:PR
INT@224,"SAVE PIX NAME:";:INPUTF
$:SCREEN1,1
460 IFPK=196THEN470ELSE480
470 SAVEMF$,&HE00,PEEK(&HB7)*256
,&HADFB:EXEC44539:GOTO60
480 CSAVEMF$,PEEK(&HBA)*256,PEEK
(&HB7)*256-1,&HB44A:EXEC44539:GO
TO60
490 CLS:PRINT@224,"LOAD PIX NAME
:";:INPUTF$:PCLS:SCREEN1,1
500 IFPK=196THEN510ELSE520
510 LOADMF$:EXEC44539:GOTO60
520 CLOADMF$:EXEC44539:GOTO60
```

Pop-Up Menus

by Bill Bernico

CoCo 3

If you like to write menu-driven graphics programs, *Pop-Up Menus* can show you how to add a professional touch. The techniques used by *Pop-Up Menus* allow you to place menus over graphics and text already on the screen. Once you choose a selection from the menu, the menu disappears, leaving the original screen intact. Run POPUPMEN to see what I mean. Let's look at how the program works.

Memory for the menus is set aside using the HBUFF command in Line 3. Then Menu 1 is defined (lines 5-10) and stored in a buffer (Line 11). Next, Menu 2 is defined (lines 12-18) and stored (Line 19). Finally, for purposes of this demonstration, a 40-column graphics screen is filled with random ASCII characters using HPRINT. In a true application, the graphics screen can also contain pictures.

In Line 24, the program jumps to the subroutine at Line 31 to place the menu on the screen. Line 31 immediately jumps to Line 33 to get a random set of coordinates (H,V). You can program the menu to pop up at the same location every time, but I want to show that the background stays intact no matter where the menu appears. When control returns to Line 31, the existing text and graphics image where the menu is to be placed is stored in Buffer 3 and the program waits for you to press a key. When you do, Menu 1 is

displayed (Line 25) and the program pauses again. When you press a key while the menu is displayed, the program restores the original screen by replacing the menu with Buffer 3. This gives the impression that the background image was never removed. When you press another key, Menu 2 is displayed in a similar fashion.

I use only two menus in POPUPMEN, but you can use as many as the memory in your CoCo will allow. The menus can also be used on the 80-column graphics screens.

Give these techniques a try in your own BASIC programs. You'll find your creations look like you've been programming for years.

The Listing: POPUPMEN

```
1 'POP-UP MENUS
   BY BILL BERNICO
    COPYRIGHT (C) JANUARY 1992
   BY FALSOFT, INC.
      RAINBOW  MAGAZINE
2 HSCREEN2:HCLS2:HCOLOR8,4:RGB:P
OKE65497,0:ON BRK GOTO 35
3 HBUFF 1,1660:HBUFF 2,1660:HBUF
F 3,1660:'CREATE THREE STORAGE B
UFFERS-ONE FOR REGULAR BACKGROUN
D AND TWO FOR MENUS
4 HCOLOR 0:'MENU TITLE #1 WILL B
E GREEN
5 HPRINT(8,1),"MENU #1":'NEXT 5
LINES ARE MENU #1 TEXT
6 HCOLOR1:'MENU TEXT WILL BE YEL
LOW
7 HPRINT(8,2),"S=Save
8 HPRINT(8,3),"L=Load
9 HPRINT(8,4),"P=Print
10 HPRINT(8,5),"2=MENU 2
11 HGET(60,4)-(130,49),1:HCLS3:'
STORE PICTURE OF MENU #1 IN BUFF
ER 1 & CLEAR SCREEN
12 HCOLOR 4:'MENU TITLE #2 WILL
BE WHITE
13 HPRINT(8,1),"MENU #2":'NEXT F
IVE LINES ARE MENU #2 TEXT
14 HCOLOR 5:'MENU TEXT WILL BE L
IGHT BLUE
15 HPRINT(8,2),"1=Sort
16 HPRINT(8,3),"2=List
17 HPRINT(8,4),"3=Append
18 HPRINT(8,5),"4=MENU 1
19 HGET(60,4)-(130,49),2:HCLS4:'
STORE PICTURE OF MENU #2 IN BUFF
ER 2 AND CLEAR THE SCREEN
20 HCOLOR8:'RETURN TO BLACK TEXT
 ON WHITE BACKGROUND
21 FOR X=0 TO 23:'HPRINT ON LINE
S 0 THRU 23
22 HPRINT(0,X),STRING$(40,RND(90
)+32):'FILL THE SCREEN WITH RAND
OM TEXT
23 NEXT X:'COMPLETE LOOP
24 GOSUB 31:'CHOOSE RANDOM LOCAT
IONS & STORE SCREEN BACKGROUND (
WHATEVER THAT MAY BE AT THE TIME
) AND STORE IN BUFFER 3
25 HPUT(H,V)-(H+70,V+45),1:EXEC
44539:'DISPLAY THE PRE-STORED ME
NU #1 & PAUSE
26 GOSUB 32:'REPLACE ORIGINAL BA
CKGROUND WHEN MENU DISAPPEARS
27 GOSUB 31
28 HPUT(H,V)-(H+70,V+45),2:EXEC
44539:'CHOOSE DIFFERENT LOCATION
S & DISPLAY MENU #2 AND PAUSE
29 GOSUB 32
30 GOTO 24:'GO BACK AND PUT MENU
 #1 AT ANOTHER LOCATION
31 GOSUB 33:HGET(H,V)-(H+70,V+45
),3:EXEC44539:RETURN
32 HPUT(H,V)-(H+70,V+45),3:RETUR
N:'DISPLAY ORIGINAL BACKGROUND &
 GO BACK FOR ANOTHER RANDOM MENU
 LOCATION
33 H=RND(249):V=RND(145):'RANDOM
 HORIZONTAL & VERTICAL LOCATIONS
 FOR MENU TO APPEAR
34 RETURN:'GO BACK
35 POKE65496,0:CLS:END
```


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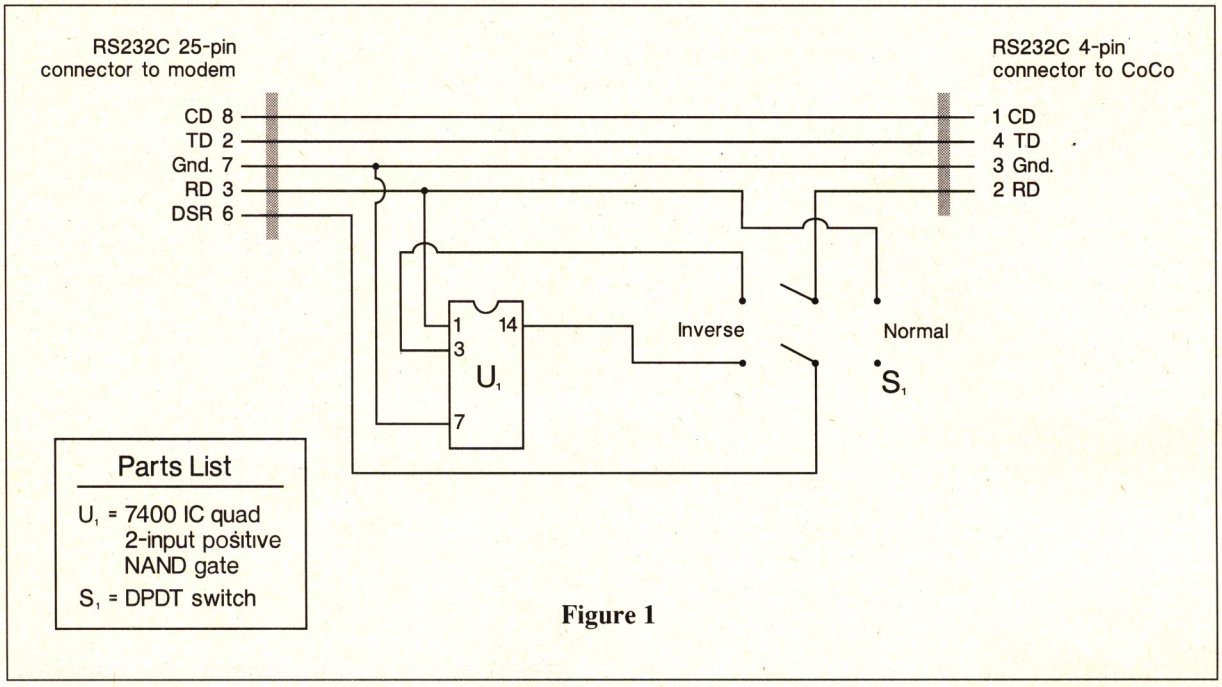

Figure 1

Interrupt-Driven Serial Communications

by Dan Charrois

Writing a BBS program or a simple message base is not as difficult as it may sound. Once the problems of serial I/O and its related timing are addressed, all that remains is to put together a "shell," or user environment. As most CoCo users are familar with BASIC, this should not be too big a task. And you can get just as fancy as you need for your own application.

In this article, I present a simple circuit and terminal driver that handle the I/O for you. This hardware/software project enables you to send and receive data reliably via the serial port on the rear of the CoCo 3. The supporting software (the environment) is left to you, giving you the freedom to put together a BASIC system that best suits your needs.

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Technical Basis

Communication through the serial port on the rear of the CoCo has never been totally reliable. Sending data through the port is fairly straightforward, but receiving data poses problems simply because the computer may not be monitoring the port at the particular moment data starts to arrive. The RS-232 Pak eliminates this problem by dedicating itself to sending and receiving serial data, allowing the computer to retrieve the data at its leisure. However, the high cost associated with the RS-232 Pak, and the fact that it is no longer being produced, has left many CoCo owners searching for alternatives.

For the computer to flawlessly receive data through the serial port with a minimum of hardware requires a monitoring algorithm that uses an interrupt as a trigger for execution. Some software sets the CoCo to interrupt at regular time intervals. By setting the interrupt frequency appropriately, the serial port can be monitored once for every time interval in which its status could

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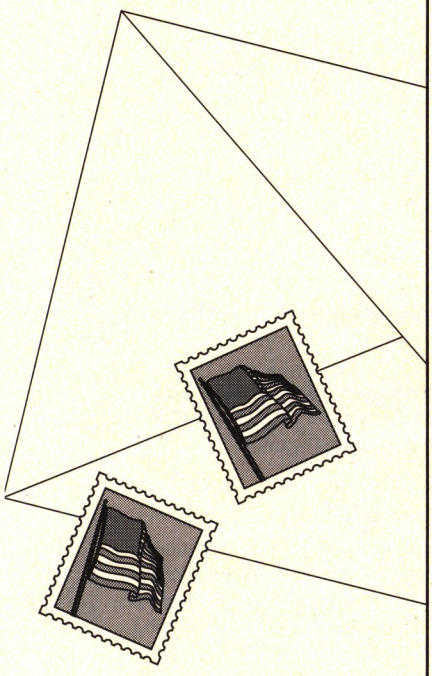


be changing. This method works quite well for terminal programs. However, these applications usually have a fairly simple foreground task. A foreground task of any complexity (such as operation of a BBS) would be slowed down appreciably by the interrupts, especially at high bps rates.

On the CoCo 3, there is a more reliable way to receive data: The GIME chip provides a serial-input interrupt that is ideal for the application. To make this work, however, we must overcome a minor problem: Modems send a logic One (High) when idle and a Zero (Low) as the start bit for an incoming byte. The computer, on the other hand, interrupts on a logic One — without any modifications, the CoCo would be interrupting continuously while the modem sits idle.

To counter this, I designed the inverter circuitry shown in Figure 1. The circuit requires a minimum of parts and only a slight modification to an existing modem cable. The sole purpose of the circuit is to invert the incoming data. All logic Ones become logic Zeroes and vice-versa. Therefore logic Zero of the start bit is inverted into a logic One, which can be used as the trigger to an interrupt.

The Inverter Hardware

The DPDT switch shown in Figure 1 allows both inverse and normal operation of the modem with the same cable. This switch controls the power to the IC. This conserves power under normal operation. Alternatively an SPDT switch could be used instead if the IC were wired directly into the power supply.

The IC itself need only be a NOT inverter. I used a 7400 (Quad Two-input Positive NAND), wired as an inverter, since it is easy to obtain. However, a less complex IC could be used as long as it performs the NOT operation. To power the IC, I chose to tap into the 5 volts produced by my modem between the signal ground and data set ready pins, but virtually any 5-volt source can be used.

One further point should be made: If both your printer and modem are connected to the serial port simultaneously, the printer must be turned off while operating the inverter circuitry — it cannot simply be placed "offline." Otherwise interrupts will occur continually.

Supporting Software

Listing 1 shows the assembly-language source code for a driver that allows the computer to operate as a simple "host." It lacks many of the bells and whistles found in some other terminal drivers, but operates reliably. BBS programs can use the routine as their terminal driver.

The driver is well-commented, but a little further explanation may help clarify some details of its operation. The algorithm provides for buffering of incoming data. If the computer does not have immediate time to read a character before another is received, the second character will not be lost. The program sets the buffer size at 256 bytes, which should be sufficient for almost every application. If you want more, change the RMB directive in Line 300.

The driver patches the INPUT, LINEINPUT and PRINT commands to use the interrupt-driven communications. Use these commands from within a BASIC program to receive and send information via the modem. In addition, INPUT and LINEINPUT are patched to disable filtering of the escape (ESC) character, and thus allow ANSI graphics (a protocol becoming more and more popular on bulletin board systems). In addition, you can generate an ESC from the keyboard by pressing SHIFT-BREAK, a feature that is not normally operational under BASIC. It should be noted that this program does not enable viewing of ANSI graphics on the host screen, but if you have an ANSI driver, it should work with the program.

CoCo 3

Listing 1: DANTERM.ASM

```
00100          ORG     3584    WE'LL USE PAGE 1 OF GRAPHIC MEMORY
00110 ************************************************
00120 *INTERRUPT-DRIVEN SERIAL COMMUNICATIONS    *
00130 *           BY DAN CHARROIS               *
00140 *YOU MUST HAVE THE CIRCUIT DESCRIBED IN THE*
00150 *ARTICLE FOR THIS PROGRAM TO WORK PROPERLY *
00160 ************************************************
00170 *PLEASE SEND ALL QUESTIONS OR COMMENTS TO:           *
00180 *DAN CHARROIS                                       *
00190 *BOX 75                                            *
00200 *LEGAL, ALBERTA                                    *
00210 *CANADA                                           *
```

```
00220 *T0G 1L0                                                *
00230 ********************************************************
00240 WRIBUF  RMB     2       LOCATION OF WRITE TO BUFFER POINTER
00250 READBUF RMB     2       LOCATION OF READ FROM BUFFER POINTER
00300 BUFFER  RMB     256     THE ACTUAL BUFFER ITSELF
00310 START   JSR     INSTAL  SET UP ALL THE RAM HOOKS
00320         LDX     #BUFFER START OF BUFFER AREA
00330         STX     WRIBUF  STORE TO WRITE BUFFER POINTER
00340         STX     READBUF AND READ BUFFER POINTER
00350         ORCC    #$50    DISABLE THE INTERRUPTS FOR NOW
00360         LDX     #DOFIRQ SET UP NEW FIRQ HANDLER
00370         STX     $110      "
00380         LDB     #27     THE ESCAPE CHARACTER
00390         STB     $A27F   PATCH KEYBOARD TO GENERATE ESC WITH SHIFT-BRK
00400         STB     $A3DA   PATCH INPUT TO DISABLE ESCAPE FILTERING
00410         LDX     #$1212  LOAD X WITH TWO NOPs
00420         STX     $F772   ENABLE INTERRUPTS IN 80 COLUMN PRINT
00430         STX     $8E0E   ENABLE INTERRUPTS DURING SERIAL OUTPUT
00440         LDB     #4      SET GIME TO INTERRUPT ON RS232 INPUT
00450         STB     $FF93     "
00460         LDB     #$5C    SET INIZ REG 0 TO ALLOW GIME FIRQs
00470         STB     $FF90     "
00480         ANDCC   #$AF    RE-ENABLE ALL INTERRUPTS
00490         RTS             AND RETURN TO NORMAL EXECUTION
00500 ****************************************
00510 * ACTUAL RS232 INTERRUPT SERVICE ROUTINE *
00520 ****************************************
00530 DOFIRQ  PSHS    A,B,X   SAVE REGISTERS WE'LL BE USING
00540         BSR     PAUSE1  START BIT RECEIVED, SO WAIT 1/2 BIT TIME
00550         LDB     #1      WE'LL BE RECEIVING BIT 0 FIRST
00560         PSHS    B       TUCK IT AWAY
00570         CLRA            INITIALIZE CHARACTER BEING RECEIVED TO 0
00580 LOOP2   BSR     PAUSE2  WAIT FULL BIT TIME
00590         LDB     $FF22   CHECK THE SERIAL PORT
00600         RORB            ROLL THE BIT RECEIVED INTO CC
00610         BCS     ZERO    IF BIT=1 (RE-INVERT CHARACTER AS WE GO)
00620         ORA     ,S      IF RECEIVING 0, SET APPROPRIATE BIT IN A TO 1
00630 ZERO    LSL     ,S      GET READY TO RECEIVE THE NEXT BIT
00640         BHS     LOOP2   IF WE HAVEN'T RECEIVED ALL 8 BITS, RECEIVE NEXT
00650         LEAS    1,S     IGNORE THE BYTE WE PUSHED ONTO THE STACK
00660         LDX     WRIBUF  GET WRITE BUFFER POINTER
00670         STA     ,X+     PUT CHARACTER INTO THE BUFFER
00680         CMPX    #START  HAVE WE FILLED UP THE BUFFER YET?
00690         BLO     WRIOK   IF NOT, WE'RE OK
00700         LDX     #BUFFER OTHERWISE START AT THE BEGINNING OF THE BUFFER
00710 WRIOK   STX     WRIBUF  STORE NEW WRITE BUFFER POINTER LOCATION
00720         CMPX    READBUF ARE WE GOING TO OVERWRITE DATA NEXT TIME?
00730         BNE     LOOP4   IF NOT, DO NOTHING
00740         LDX     READBUF OTHERWISE, BUMP THE READ BUFFER POINTER UP
00750         LEAX    1,X     LETS US ALWAYS HAVE THE FULL BUFFER FOR STORAGE
00760         CMPX    #START  ARE WE AT THE TOP OF THE BUFFER?
00770         BLO     LOOP6   IF NOT, DON'T WORRY ABOUT IT
00780         LDX     #BUFFER ELSE, START AT THE BEGINNING OF THE BUFFER AGAIN
00790 LOOP6   STX     READBUF UPDATE THE READBUFFER POINTER
00800 LOOP4   LDB     $FF22   CHECK THE SERIAL PORT
00810         RORB            ROLL BIT INTO CC
00820         BCS     LOOP4   IF THE STOP BIT ISN'T THERE YET, CONTINUE WAITING
00830         CLR     $FF93   RE-ENABLE THE RS232 INTERRUPT
00840         LDB     #4        "
00850         STB     $FF93     "
00860         PULS    A,B,X   PULL BACK THE REGISTERS SAVED
00870         RTI             RETURN FROM THE INTERRUPT
00880 PAUSE2  BSR     PAUSE1  THIS EXECUTES PAUSE1 TWICE
00890 PAUSE1  PSHS    A       TUCK AWAY THE REGISTER WE'RE USING
00900         LDA     $E6     DETERMINE THE BAUD RATE CONSTANT FOR 1/2 BIT
00910 LOOP3   BRN     LOOP3   FINE-TUNE DELAY INTERVAL
00920         DECA            DECREASE THE BAUD RATE COUNT
00930         BNE     LOOP3   IF WE'RE NOT AT ZERO, KEEP GOING
00940         PULS    PC,A    BRING BACK A, AND CONTINUE WHERE WE LEFT OFF
00950 **********************
00960 *INSTALLATION ROUTINE*
00970 **********************
00980 INSTAL  LDA     #40     FIRST, SET THE BAUD RATE TO DEFAULT AT 1200
00990         STA     $E6
01000         LDX     $168    CHECK OUT THE CURRENT HOOKS
01010         CMPX    #PRINT  ARE THEY ALREADY IN PLACE?
01020         BEQ     RETURN  IF SO, FORGET ABOUT CHANGING THEM
01030         STX     PROUT+1 IF NOT, INSTALL THEM AT THE END OF THIS MOD.
01040         LDX     #PRINT  TAKE THE START ADDRESS OF THE MODIFICATION
01050         STX     $168    AND PUT IT IN THE RAM HOOK FOR PRINT
01060         LDX     $16B    NOW, TAKE THE INPUT RETURN LOCATION
01070         STX     INOUT+1 AND PUT IT AT THE END OF THE INPUT MODIFICATION
01080         LDX     #INPUT  TAKE THE START ADDRESS OF THE INPUT MOD.
01090         STX     $16B    AND PUT IT IN THE INPUT RAM HOOK
01100         LDX     #CHRIN  ROUTINE TO RECEIVE ONE CHARACTER AT A TIME
01110         STX     $96F    DEFINE THIS AS USR8
01120         LDX     #CHROUT ROUTINE TO SEND ONE CHARACTER TO THE MODEM
01130         STX     $971    DEFINE THIS AS USR9
01140 RETURN  RTS             THAT'S IT FOR NOW
01150 *****************
01160 *THE PRINT PATCH*
```

The driver adds two "commands": USR8 and USR9. The command line

```
A=USR8(0)
```

causes Variable A to take on the value of the ASCII code for the last character received from the modem. If no character is received, A equals zero. USR8 operates as a type of modem-exclusive INKEY$. The command line

```
A=USR9(C)
```

where C is the ASCII code of a character, causes the character to be sent exclusively to the modem and not the screen. This is handy for sending control commands to the modem that look messy onscreen. Both of these USR commands need not have their execution addresses defined from BASIC — this is handled by the machine-language program.

Upon execution, the terminal driver defaults to 1200 bps. This can easily be changed at any time with a POKE statement: POKE &HE6,180 sets the driver to 300 bps, and POKE &HE6,40 sets it to 1200 bps.

Up 'n' Running

To create the machine-language driver, enter and assemble the source code in Listing 1. Alternatively, you can use the BASIC program in Listing 2 to create the machine-language driver and save it to disk as DANTERM.BIN.

To exectute DANTERM, use LOADM and EXEC&HF04 from within a BASIC program to initialize the system. Note: The execution address will be different if you assemble DANTERM using a different buffer size. As written, the software doesn't support the 32-column screen — you must be using 40 or 80 columns for the driver to work properly. Otherwise you'll get a garbled mess on your screen upon execution of the driver.

After the EXEC command is executed, if the BASIC program stops execution and the system returns to the command mode, the interrupts are reset and incoming communication is disabled. This was left unpatched in order to provide a type of security for BBS systems. If a user manages to drop into the command mode, by error or otherwise, he can no longer communicate with the host. Also related to BBS security, Control-C and BREAK are left enabled. Those wanting to disable these commands can modify the source code or use the ON BRK command.

```
01170 ******************
01180 PRINT   PSHS    B,A      SAVE A BIT OF THE ENVIRONMENT
01190         TST     $6F      SEE WHAT DEVICE WE'RE PRINTING TO
01200         BNE     PR2      IF NOT PRINTING TO THE SCREEN, RESUME
01210         JSR     $8E0C    OTHERWISE, SEND DATA OUT THE SERIAL PORT
01220 PR2     PULS    B,A      PULL BACK THE ENVIRONMENT
01230 PROUT   JMP     $FFFF    CONTINUE NORMAL PRINT OPERATION
01240 ******************
01250 *THE INPUT PATCH*
01260 ******************
01270 INPUT   CLR     $70      TELL INPUT THAT THERE IS SOMETHING LEFT
01280         TST     $6F      ARE WE INPUTTING FROM NORMAL CHANNELS?
01290         BNE     INOUT    IF NOT, RESUME NORMAL INPUT OPERATION
01300         LEAS    2,S      LET'S MODIFY THE STACK A BIT
01310         PSHS    X,B,CC
01320 POLL    JSR     [$A000] CHECK THE KEYBOARD FIRST
01330         BNE     PULRET   IF WE HAVE SOMETHING, TELL INPUT ABOUT IT
01340         BSR     LOOKBF   BRANCH TO THE LOOKBUFFER  SUBROUTINE
01350         BEQ     POLL     IF NOTHING HERE EITHER, KEEP LOOKING
01360         BRA     PULRET   OTHERWISE, TELL INPUT ABOUT IT
01370 LOOKBF  LDX     READBUF  WHERE ARE WE IN THE READING BUFFER?
01380         CMPX    WRIBUF   ARE WE CAUGHT UP?
01390         BNE     LOOKB2   IF NOT, GET THE CHARACTER
01400         CLRA             ELSE, CLEAR THE REGISTER
01410         RTS              AND RETURN
01420 LOOKB2  LDA     ,X+      GET THE CHARACTER FROM THE BUFFER
01430         CMPX    #START   IS OUR BUFFER POINTER AT THE END OF THE BUFFER?
01440         BLO     LOOKB3   IF NOT, DON'T WORRY ABOUT IT
01450         LDX     #BUFFER AND IF SO, START AT THE BEGINNING AGAIN
01460 LOOKB3  STX     READBUF  STORE THE NEW BUFFER POINTER
01470         TSTA             RESTORE CC TO THE STATUS OF A
01480         RTS              AND RETURN
01490 PULRET  PULS    X,B,CC,PC       RE-ENTRY PROCEDURE IF WE FOUND SOMETHING
01500 INOUT   JMP     $FFFF    AND RE-ENTRY PROCEDURE IF WE DIDN'T
01510 ******************************************************
01520 *THIS ROUTINE POLLS THE KEYBOARD AND BUFFER FOR ONE     *
01530 *CHARACTER AT A TIME.  TO USE, TYPE A=USR8(0), AND 'A'  *
01540 *WILL EQUAL THE ASCII CODE OF THE LAST CHARACTER        *
01550 *RECEIVED (OR 0 IF NONE)                               *
01560 ******************************************************
01570 CHRIN   JSR     [$A000] CHECK THE KEYBOARD FIRST
01580         BNE     FOUND    IF SOMETHING WAS PRESSED
01590         BSR     LOOKBF   CHECK OUT THE BUFFER
01600 FOUND   TFR     A,B      MAKE D=A
01610         CLRA             "
01620         JMP     $B4F4    PUT D INTO FPAC1, THEN RETURN TO BASIC
01630 ******************************************************
01640 *THIS ROUTINE SENDS A SINGLE ASCII CHARACTER TO THE     *
01650 *MODEM BUT NOT THE SCREEN.  TO USE, TYPE A=USR9(C) WHERE*
01660 *'C' IS THE ASCII CODE OF THE CHARACTER YOU WISH TO     *
01670 *SEND.  ('A' IS JUST A DUMMY VARIABLE)                 *
01680 ******************************************************
01690 CHROUT  JSR     $B3ED    GET THE NUMBER FROM FPAC1 TO D
01700         TFR     B,A      PUT THE LSB INTO A
01710         JMP     $8E0C    SEND THE CHARACTER TO THE MODEM
01720         END     START    AND THAT'S ALL, FOLKS!
```

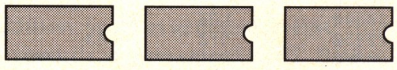
A Caveat

Although the driver provides only for simple communication with a modem, it has performed perfectly in all my tests. The driver is capable of receiving data at full speed without misinterpreting a single character. However, one potential problem area exists: The software gives higher priority to incoming characters than to outgoing characters. Thus, if a character is received by the host while another is being sent, the character leaving may be garbled. The only time this becomes a problem is when a macro or other file is being sent to the host. As the first characters of the macro or file are being echoed by DANTERM, they may be interrupted by the incoming characters. As a result, the calling computer may receive garbled echoes. However, while this may cause some confusion on the part of the caller, the characters are perfectly recieved by the host.

Summary

This small hardware/software project could be the impetus for the latest and greatest BBS. Or perhaps your needs aren't that complex. In any case, you should be able to put the commands supported by DANTERM to use in a variety of applications.

Feel free to experiment with and modify the source code. As it is interrupt-driven, the cable circuitry should work with OS-9. However, device drivers and descriptors need to be written. I would appreciate hearing from anyone who makes improvements to the routines. Although I can be reached at many Edmonton-area BBSs, you can send questions or comments to me at the address given above. ❑



Listing 2: DANTERMB

```
1 'SERIAL COMM
2 'WRITTEN BY DAN CHARROIS
3 'COPYRIGHT (C) NOVEMBER 1991
4 'BY FALSOFT, INC.
5 'RAINBOW MAGAZINE
10 'BASIC LOADER FOR INTERRUPT-
20 'DRIVEN SERIAL COMMUNICATIONS
30 'BY:  DAN CHARROIS
40 'IF YOU DON'T HAVE A DISK
50 'DRIVE, CHANGE THE "SAVEM"
60 'IN LINE 140 TO "CSAVEM"
70 '
80 FORX=&HF04 TO &H1017
90 READA$:A=VAL("&H"+A$):T=T+A
100 POKEX,A
110 NEXTX
120 IFT<>27122THENPRINT"THERE IS
 AN ERROR IN ONE OF THE VALUES I
N THE DATA LINES":END
130 INPUT"PRESS ENTER WHEN DISK
IS READY  FOR FILE TO BE SAVED";
E$
140 SAVEM"DANTERM",&HF04,&H1017,
&HF04
150 END
160 DATA BD,0F,92,8E,0E,04,BF,0E
,00,BF,0E,02,1A,50,8E,0F,36,BF,0
1,10,C6,1B,F7
170 DATA A2,7F,F7,A3,DA,8E,12,12
,BF,F7,72,BF,8E,0E,C6,04,F7,FF,9
3,C6,5C,F7,FF
180 DATA 90,1C,AF,39,34,16,8D,4D
,C6,01,34,04,4F,8D,44,F6,FF,22,5
6,25,02,AA,E4
190 DATA 68,E4,24,F2,32,61,BE,0E
,00,A7,80,8C,0F,04,25,03,8E,0E,0
4,BF,0E,00,BC
200 DATA 0E,02,26,10,BE,0E,02,30
,01,8C,0F,04,25,03,8E,0E,04,BF,0
E,02,F6,FF,22
210 DATA 56,25,FA,7F,FF,93,C6,04
,F7,FF,93,35,16,3B,8D,00,34,02,9
6,E6,21,FE,4A
220 DATA 26,FB,35,82,86,28,97,E6
,BE,01,68,8C,0F,C0,27,21,BF,0F,C
C,8E,0F,C0,BF
230 DATA 01,68,BE,01,6B,BF,10,00
,8E,0F,CE,BF,01,6B,8E,10,02,BF,0
9,6F,8E,10,10
240 DATA BF,09,71,39,34,06,0D,6F
,26,03,BD,8E,0C,35,06,7E,FF,FF,0
F,70,0D,6F,26
250 DATA 2B,32,62,34,15,AD,9F,A0
,00,26,1F,8D,04,27,F6,20,19,BE,0
E,02,BC,0E,00
260 DATA 26,02,4F,39,A6,80,8C,0F
,04,25,03,8E,0E,04,BF,0E,02,4D,3
9,35,95,7E,FF
270 DATA FF,AD,9F,A0,00,26,02,8D
,DA,1F,89,4F,7E,B4,F4,BD,B3,ED,1
F,98,7E,8E,0C
```

Confused?

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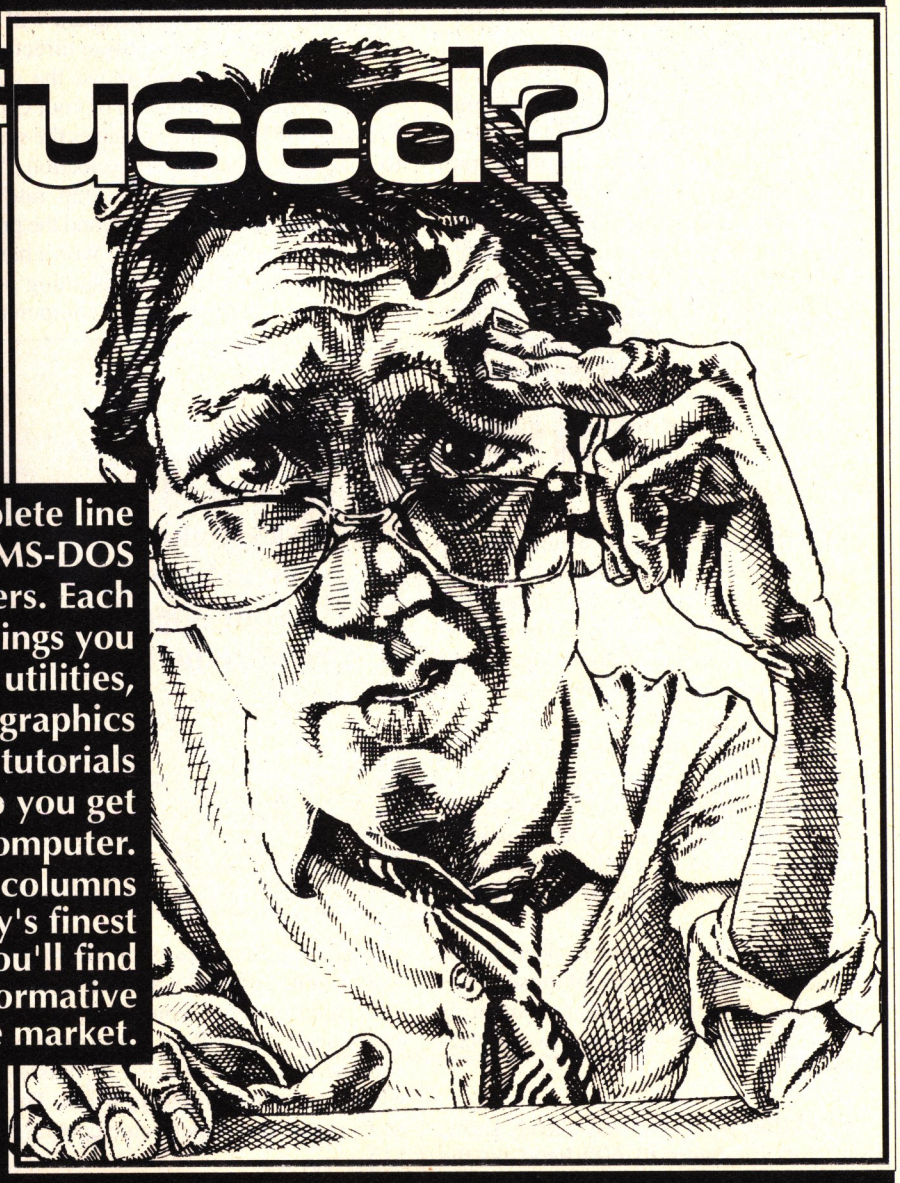

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Utility 64K

Super Boot

Super Boot is a nifty utility program designed for any CoCo system with at least 64K and Disk BASIC 1.1/2.1. It does some unique things that will make operating your favorite computer a real pleasure.

Super Boot is supplied on a single 5¼-inch unprotected floppy disk. Although searching the directory of this disk results in finding just one file, BCONFIG, there are hidden files that make the program do its thing. After inserting a back-up copy of *Super Boot* into your disk drive and typing BCONFIG, you are greeted with a menu of five choices:

Step Rate — Use this to specify the step rate of your disk drives. Disk BASIC defaults to 30ms, which is fine for older drives. But newer drives can step as fast as 6ms. Several choices are provided, and you select the one you want using the arrow keys.

Number of Tracks — Again, older drives could not reliably read the innermost tracks of a disk; therefore, Disk BASIC supports only 35 tracks. If you are using a newer drive, it's likely it will read 40 tracks. The system also supports 80-track drives.

Sides — If you have double-sided drives, you can access the back side of those drives by selecting Double. The program supports up to four single-sided drives or two double-sided drives.

Baud Rate — As you may already know, your CoCo defaults to 600 baud on the printer port, but most printers will run a lot faster. I use a serial-to-parallel interface that is set to 9600 baud.

Autoboot File — This option lets you specify what program to run or execute automatically. It's really handy to be able to execute a word processor or any other program without having to enter in routine commands.

The current version of *Super Boot* also supports double-speed disk access and the ability to set the CoCo 3's screen colors on boot up. Once you have answered all the menu options, you are prompted to insert a disk in the drive to write the new boot file. Once that is done, all you have to do from then on is insert the boot disk in the drive and enter DOS. If you have selected an Autoboot filename, that program will execute. Otherwise a two-column directory is presented, and you can move the cursor block to select the program of your choice. Pressing the ENTER key causes the system to load and execute your selection. Your disk drives are set to the step rate and number of sides you selected, and the printer baud rate is set as well. You won't have to remember to enter time-consuming pokes every time you turn on your computer.

Installing *Super Boot* on all your disks makes your system "wake up" to your specific requirements.

Installing *Super Boot* on all your disks makes your system "wake up" to the specific requirements you have previously established. *Super Boot* is a super program and one that most serious CoCo users will want to have in their bag of tricks. The best news is that this super value cost less than $15.

(Sub-Etha Software, P.O. Box 152442, Lufkin, TX 75915, 409-639-3842; $14.95 plus $2.50 S/H)

— Jerry Semones

Programming 64K

CF83 Forth

Until now there were only two languages that were readily available to people who use only Disk BASIC on their Color Computer 2 or 3: assembler and BASIC. With the addition of BDS Software's *CF83 Forth* system, a very powerful computing language is now available. FORTH is a unique language in that it is not restricted to the finite set of instructions that come with the language. In BASIC you can use only the instructions that come with it; you cannot create your own. In FORTH, the programmer uses the basic set of words (instructions) to define newer and more powerful words. These words can then be added to the vocabulary of the language. In this way the programmer has the ability to create his own language tailored to a specific task.

You can find out more about FORTH in *Starting FORTH* by Leo Brodie. The book should be available in a college or university library and perhaps in your local public library. To whet your appetite, BDS Software also has a demonstration version of *CF83 Forth* available for $3 — it is available on Delphi, too.

Each disk is available with or without printed documentation, and the prices of the disks differ accordingly. The printed manuals are not bound, but the quality of the printing is good. In either case each disk comes with its own Reader program. This program allows you to read the accompanying documentation or print it on your printer. The reader program is a sophisticated manual browser that lets you page through the documentation in either direction. You are also able to set the parameters for your printer and print a page, a range of pages or the whole document. The program works only with the documents it comes with, so it can't be used to view other files. This is an exceptionally well-designed and -thought-out program and is a nice additional feature of the packages.

FORTH is intended to be a modular operating system/programming language. In keeping with this tradition, BDS Software's *CF83 Forth* is available as a series of separate modules available on separate disks. There are currently three modules available: the foundation, a block editor, and a double-number extension set. BDS also offers a technical reference manual and a tutorial package. There are plans for eleven more modules that cover graphics, sound, math, system enhancements and a module to allow FORTH programs to execute directly from BASIC.

The Foundation Disk

The *CF83 Forth* foundation disk contains the basic FORTH operating system and the basic FORTH word set. It is the base

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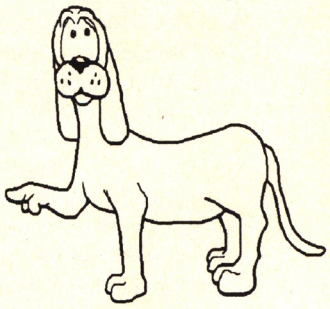

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M7	GR7	H2	U7	GA7
	GR8	H3	U8	GA8
A1	GR9	H4		GA9
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that all the other modules in the system use. None of the other modules operate without this disk. The program runs only on the VDG screen, but it creates its own 64-character graphics screen. This screen is very readable on both color or monochrome displays (including TVs).

The *CF83 Forth* foundation disk contains the basic FORTH operating system and the basic FORTH word set.

FORTH is intended to be both an operating system and a programming language, and *CF83 Forth* is no exception. It uses its own routines to write to and read from disks. These routines are hard-coded to work with standard 35-track single-sided CoCo drives. I tried the programs with Burke & Burke's Hyper-I/O and they worked fine except that I was unable to use my double-sided drives as double-sided or as anything other than standard CoCo drives.

The Block Editor

The foundation disk contains no built-in editor, so unless you are a FORTH expert and are able to write your own, you should probably purchase BDS Software's Block Editor as well. FORTH programs are stored in blocks; each block is 16 lines by 64 characters, or 1024 bytes. BDS Software's Block Editor is a full-screen FORTH editor that is designed to edit one FORTH block at a time. It contains all the features needed in a block editor. You use the cursor keys to move around the screen to edit an old block or while you are creating a new one. There are ways to load the editor with the next block, the previous block or any block you choose. You can also save a block or abort an edit of a block. All these commands are accessible with two keystrokes.

FORTH gains access to the blocks by use of block numbers. For *CF83 Forth* there are 157 blocks on a disk. These blocks are stored on the disk in binary format, so you'll be able to edit them only with BDS Software's Block Editor (or an equivalent). This also means that the blocks will not show up on any directory listing of the disk — there is no FORTH word that lists the blocks on a disk. So you'll have to keep track of what blocks are on each disk.

The Technical Reference Manual

This is a shortened version of the FORTH-83 standard. The standard states what features a language must have before it can be called FORTH. The FORTH-83 standard, like all language standards, is a little vague about some aspects of the language. This is especially true for implementation details. This is done to allow the designers of a FORTH system the freedom to take advantage of the special features of different machine platforms. The Technical Reference Manual removes the vagueness from the standard by specifying the details of this version of FORTH. It describes all the basic words included with the foundation disk and gives a little insight into the internals of this version. It is not intended to teach you FORTH. It assumes that you are an experienced FORTH programmer and know something about the inner workings of the language. If you are a beginning FORTH programmer, this is not for you. Leo Brodie's *Starting FORTH* and the Tutorial described next would be a better investment. The manual comes on two disks and is a fairly complete description of this implementation of FORTH.

The FORTH Tutorial

This is a good introduction to the *CF83 Forth* system. It gives you a far more complete definition and description of FORTH than I have here. It also takes you on a tour of the FORTH language and operating system. There are several small programs you can enter to see FORTH in action, and the text is easy to read and understand. After reading through the tutorial, you should be familiar enough with FORTH to write some simple programs. With some persistence and a little trial and error, you should even be able to write more complicated programs. The tutorial is really designed to be used in conjunction with a more complete FORTH book, such as *Starting FORTH*. I bought this book when I got my first FORTH system in 1987 and it is still an indispensable part of my FORTH library.

The FORTH Demo

I mentioned in the beginning of this review that BDS Software has a demonstration version of the foundation disk available. This is an almost complete version of the foundation disk. The only words that are missing are the words that access the disks, so you can write programs, but you can't save them or read other programs from the disk. It also includes a good portion of the FORTH tutorial described above. If you are unfamiliar with FORTH but are interested in seeing what it is like, this is good way to go. The $3 BDS charges is a great bargain and the demo is also available from Delphi in the CoCo SIG.

Conclusion

Together the disks I have described form a good basic FORTH environment for both the novice and the experienced FORTH programmer. I can find only one thing missing in the system: There is very little error trapping, which makes the system remarkably easy to crash. (Note, however, that the lack of error trapping is part of the reason why *CF83 Forth* is so fast.) While it is traditional to make the programmer responsible for most aspects of error control, a little more error trapping would be helpful. Almost any disk error causes the system to either crash completely or to lock up. This may also cause the data on your disks to be corrupted, so as the manuals suggest, you should back up your disks often. This should not really deter someone from purchasing the products since you can do similar things in both BASIC and Assembler if you are not careful. One of the first things I learned about computers was where the Reset and the On/Off switches were.

I would like to say that while FORTH is a little harder to learn than BASIC, it is much faster and more powerful than BASIC. It is also much easier to learn than Assembler and for most applications just as fast or nearly so. Overall the program and the environment are of good quality, and I recommend them for anyone who wants to learn a powerful new language or anyone who already knows FORTH and wants to write some applications for the CoCo. I am already looking forward to reviewing the other modules as they become available.

(BDS Software, P.O. Box 485, Glenview, IL 60025-0485, 708-998-1656; FORTH-83 foundation disk, $17; Block Editor, $18.75; Technical Reference Manual, $17.25; FORTH Tutorial, $16; FORTH Demo, $3)

— Chris Hyde

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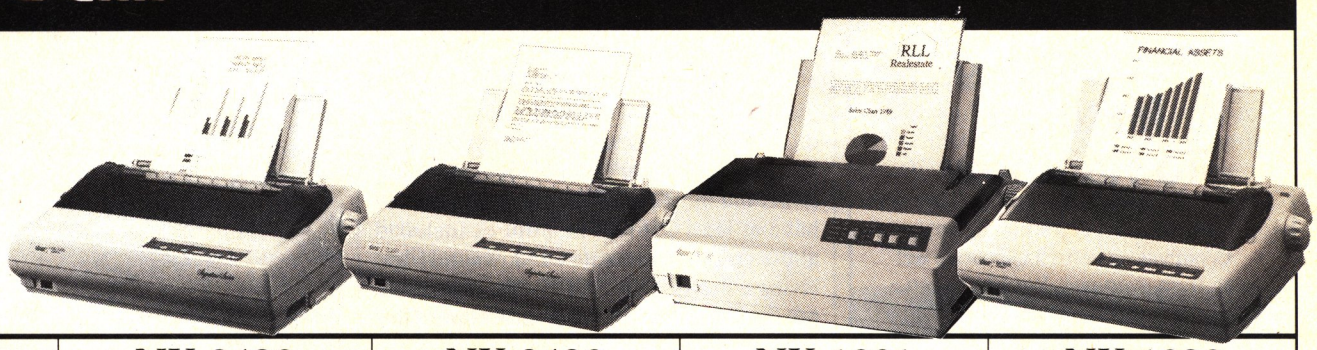

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Speed	222CPS	222CPS	180CPS	225CPS
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users (and even some not so new), its cryptic error messages and complexity are sometimes overwhelming. This can be discouraging and very frustrating. *Tools II* from CoCoPRO! does a good job of making the OS-9 environment a little friendlier and easier to use.

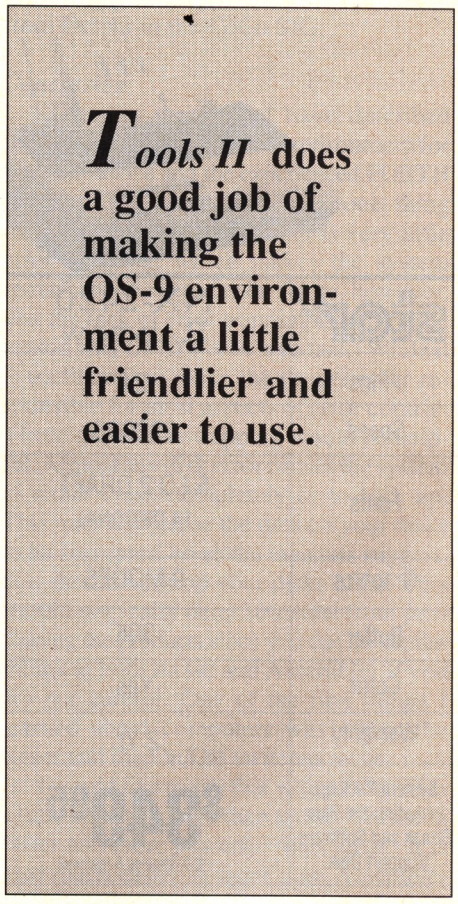
Tools II is a collection of 27 utilities that make the time you spend on your CoCo 3 more productive and more enjoyable. The utilities should work on a 128K system, but to get the most out of the them you should have at least 256K. The utilities included allow you to manipulate windows and files, change the text in ASCII files, schedule processes and make your procedure files more powerful and flexible.

One of the nicest features of the package is the inclusion of three install procedure files. You simply run the procedure file fitting your system. Procedure files are provided for single- and dual-floppy drives, and hard drive systems. The procedure file copies the utilities from the original distribution disk to the `CMDS` directory of your system disk. This is a feature found with many MS-DOS and Macintosh programs and one of the reasons their programs can be installed easily. It is good to see this trend moving into the OS-9 community. If you want, you can manually copy the utilities to *any* directory or directories.

While it would take too much space to describe and discuss all 27 utilities, I will highlight seven I found most useful or interesting. The first utility is `select`. `select` simply makes the specified window the current window. This is similar to pressing the CLEAR key until the desired window is displayed. The advantage of this command is that it can be used from within a procedure file, so you can create several windows and select the one you want displayed. While the command `display 1B 21 >/` *window* performs the same function, `select` is much easier to remember.

Next is `wmemu`, which allows you to create a menuing interface for OS-9. While it's not a point-and-click interface, it does use hot keys, so option selection is quick and easy. The program uses text files created by the user to tell it what options to display and what to do when certain options are selected. With this program and a text editor you can build a fairly extensive menuing environment for OS-9. This includes running programs, such as a word processor, from a menu and calling other menus. With the help of a knowledgeable OS-9 user to build the menu files, a novice could be using and enjoying the power of OS-9 fairly quickly and with fewer initial problems.

There is, however, one small problem with `wmenu`. I found that it would display the menu on top of a just completed directory listing or the last page of a listed file without giving the user enough time to read what's on the screen. This is annoying, but can be avoided by using an undocumented utility included on the *Tools II* disk. The utility's name is `pse` and it simply prints a prompt



and pauses the display until another key is pressed. In this way the menu is displayed after the user presses a key. The utility is not copied by the install procedure files so if you intend to use it, you will have to copy it into the `CMDS` directory yourself. `pse` is a version of the `pause` command provided with the original *Level II Tools* package.

If you've tried to backup two disks that were formatted differently, say a 35-track, single-sided disk to a 40-track, double-sided disk, you've found `backup`'s limitation. While you can get around this with `dsave`, the command line can get fairly complicated. With the `bak` utility included in *Tools II* you can do this easily, and like `dsave`, you can copy only those directories you want or an entire disk. Unlike `dsave`, `bak` checks the file dates of both the source file and the destination file (if it exists). If the source file is newer than the destination file, `bak` overwrites the destination file; otherwise it does not copy the file. This should save time if you periodically backup your data disks.

The next two utilities are very useful for systems with hard drives, though they can

be used on floppy-based systems as well. If you've ever searched though directory listings for a file, `find` is for you. `find` searches a hard drive or any portion of it for a filename and tells you in which directory it is located. It also accepts wildcard characters, so you don't have to remember the exact name of the file. I should warn you that it is not very fast, so if you are searching a hard drive, you may want to get a cup of coffee and a snack while it searches.

If you are tired of entering long pathnames to move around your hard drive, `go` is the answer to your prayers. `go` uses short aliases to change directories. It uses a file to store the names of the aliases and the complete pathlists to the directory for each alias. `go` builds this file for you or you can build it using a text editor. As an example, you can tell `go` that `c_sources` is the alias for the directory `/h0/PROGRAMS/SOURCES/C`. You can type `go c_sources` and the current data directory is changed.

Next is `gsar` (global search and replace), which is one of the file-conversion utilities. It replaces any text you specify in a file with almost any other text you want. For example you could type a form letter using `c_name` in place of the customer's name. You could then run `gsar` to replace `c_name` with the name of a customer and print the letter. You could then replace the customer's name with another, print the letter again and continue in this way until you've gone through your customer list. While this is not as fast or as easy to use as a mail-merge program, it serves the purpose and is also more versatile.

The last utility I'll mention is one that has a lot of potential. It is also one that I've been waiting to see for a long time. It is called `demon` and is a complete and easy-to-use background task manager. What it does is sit in the background and periodically check its list of scheduled processes to see if one needs to be run. If it is time to run one, it runs it and continues as before. It runs just about any program you want, on the date and at the time you specify. This type of program is used extensively in the UNIX world, and there are many uses for it in the OS-9 world as well. Its usefulness is limited only by your imagination and your CoCo's hardware.

The accompanying manual was complete but had one major error and a few minor typos. The major error in the manual is in the documentation for `wmenu`. In the command syntax it states that the `-c` option clears the screen before the menu is displayed. This is not the case. Using the `-c` option on the command line turns off screen clearing. It also says that the `-m` option closes the overlay window on which the menu is displayed before the options are run. Just the opposite is true — using this option does not close the overlay, and the options run in the overlay window. These two options are actually defaults for `wmenu`, and using the `-c` or `-m` options turns them off. Also in error are the examples of specifying options on the command line for `wmenu`. The options are not indented as the text specifies and the program requires.

All of the programs in *Tools II* are designed to run with the stock OS-9 Shell and the utilities included on the original Level II disk. While they work with most of the replacement utilities available, there may be some minor incompatibilities. I used all of the utilities in the package with both the stock Shell and *Shell+* (by Ron Lammardo) and only `fconvert` had some problems with *Shell+*. *Shell+* seems to strip characters (such as % and -) from the command line. But you can use the ASCII values instead, and this is only a minor inconvenience. Another problem is that `bak` does not work correctly with Jamie Wilmoth's `cp` utility. These problems should not reflect badly on the programmer however, since there are a large number of replacement utilities available and some incompatibilities between programs is inevitable.

Dave Myers of CoCoPRO! was very helpful with the problems I had, and I find him to be very friendly and open to suggestions about improving the utilities. This friendly and open attitude is common among CoCo vendors and is one of the reasons I enjoy working with the CoCo community so much. The errors in the manual will be corrected in the next edition and the `pse` utility will be fully documented as well. Dave Myers told me the next edition of the manual should be ready by the time you read this. Overall the programs and documentation are very good. The problems I found with the package are relatively minor and do not prevent me from recommending *Tools II*. The price is extremely reasonable for everything you get, and I look forward to dealing with Dave and CoCoPRO! in the future.

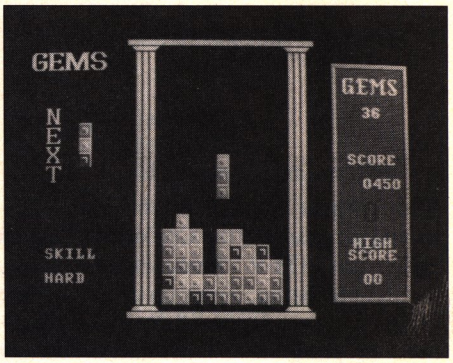
(CoCoPRO!, 1334 Byron, Ypsilanti, MI 48198; (313) 481-3283; $34.95)

— Chris Hyde

Game	CoCo 3

Gems

Gems, a new action arcade game similar to the popular PC hit *Tetris*, runs on your CoCo 3 and requires a disk drive. *Gems* features four to six different object shapes that fall from the top of the screen. The object of the game is to match the various shapes and colors either horizontally, vertically or diagonally. When you get a match, all adjacent *gems* (objects) vaporize and disappear, thus increasing your score. At unexpected times, a unique, universal gem will fall and vaporize all of the gems on the screen matching the first color it strikes. Although you can't rotate the falling gems horizontally, you can rotate the vertical pattern as they fall. You can also move



them from right to left and cause them to fall into the column of your choice.

There are three skill levels and 10 play levels. The various objects you can select for play include gemstones, card suits, dice, and squares. These shapes coupled with color combinations make for exciting play and numerous ways of making matches. As play progresses within a level, the speed with which the objects fall increases, thus making split-second decisions more difficult. The next pattern of gems is shown on the screen so you can plan ahead on your next move. Your score is continually displayed on the screen, and the top 10 players' names are shown after each game.

Game play is controlled with either the keyboard arrow keys or a joystick. Both worked equally well for me, and I was surprised at the ease of play while using the arrow keys. *Gems* can also provide stereo sound effects when used with an Orchestra-90 CC cartridge plugged into a Multi-Pak interface.

Gems is fun to play, and I enjoyed the simple theme. The graphics are colorful, sharp and vivid. Instructions are provided on a two-page sheet, but you don't really need them to play the game. I liked *Gems* and am sure you will too.

(Eversoft Games, Ltd., P.O. Box 3354, Arlington, WA 98223-3354, 206-653-5263; $24.95 plus $2.50 S/H)

— Robert Gray

Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, your assurance that we have seen the product and have ascertained that it is what it purports to be.

CheckBook+ OS-9, is a checkbook balancing program for the CoCo 3 with a disk drive and OS-9. Features pull-down/mouseable menus; a pop-up calculator; the ability to graph by the month using bar-, line- or pie-graphs; and various sorting utilities. A Disk BASIC version is also available. *Sub-Etha Software, P.O. Box 152442, Lufkin, TX 75915, (409) 639-3842; $24.95 plus $2.50 S/H.*

Deluxe Terminal, a Disk BASIC terminal communications program for the CoCo 3 with a disk drive and a monitor capable of displaying 80-column text. Supports the serial I/O port up to 2400 bps,and the Deluxe RS-232 Pak and the Disto Serial I/O Board up to 9600 bps. Features a full text editor, X/Ymodem and ASCII file transfers, split-screen conference mode, programmable macro keys, and full disk support including multifile copy, kill, rename, format, archive and unarchive. It is compatible with ADOS. *CER-COMP Ltd., 5566 Richochet Avenue, Las Vegas, NV 89110, (720) 452-0632; $34.95 plus $4 S/H.*

Goodies Disk Two, a set of 13 utilities written in BASIC09 and assembly language. Includes a VMS-style E-mail system, a password setting utility, a label printer, a bulk disk copier, a Delphi forum-message reader, and several other utilities. The source code is provided, and the author encourages experimentation with the software. Requires a CoCo with a disk drive and OS-9. *The Warped Drive, 54 Martindale Drive NE, Calgary, AB T3J 2V4, Canada, (403) 280-8870; $12, $14 Cdn.*

MiniBanners OS-9 Version, allows you to print single- or multiple-line banners. Included with *MiniBanners* is a collection of more than 30 character styles to use for your banners. Requires OS-9, a CoCo 3 and a disk drive. A Disk BASIC version is also available. *Sub-Etha Software, P.O. Box 152442, Lufkin, TX 75915, (409) 639-3842; $19.95 plus $2.50 S/H.*

MVBanner, a banner creator for your celebration needs. Features pull-down menus and pop-up windows, editing and saving of banner messages, configurable individual characters, two fonts, the ability to create images for banner use (20 images supplied), and onscreen viewing of completed banners. Requires a 256K minimum CoCo 3, OS-9 Level II, *Multi-Vue*, and an 80-column monitor. A mouse/joystick with Hi-Res adapter is recommended though not required. *ColorSystems, P.O. Box 540, 4616 Castle Hayne, Castle Hayne, NC 28429, (919) 675-2426; $20.*

OS-9 Level 2 Game Pack, a collection of five popular games adapted for your CoCo 3. The games included are *CoCothello*, *CoCoYahtzee*, *KnightsBridge*, *Minefield*, and *Sea Battle*. Requires a 256K minimum CoCo 3, a disk drive, a single- or dual-button mouse or joystick (mouse highly recommended; keyboard mouse supported), and OS-9 Level II. *Multi-Vue* is not required for any of the games. *ColorSystems, P.O. Box 540, 4616 Castle Hayne, Castle Hayne, NC 28429, (919) 675-2426; $34.95.*

Variations of Solitaire, a collection of five variations of the popular single-player card game. Variations included in this package are *Pyramid*, *Klondike*, *Spider*, *Poker*, and *Canfield*. Requires a 256K minimum CoCo 3, a disk drive, a single- or dual-button mouse or joystick (mouse highly recommended; keyboard mouse supported), and OS-9 Level II. *Multi-Vue* is not required for any of the games. *ColorSystems, P.O. Box 540, 4616 Castle Hayne, Castle Hayne, NC 28429, (919) 675-2426; $34.95.*

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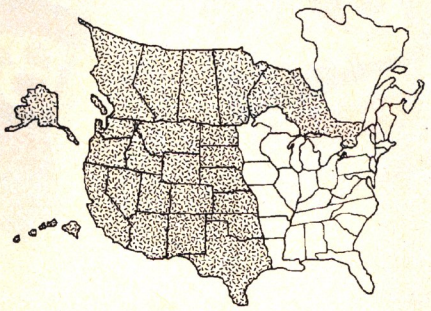

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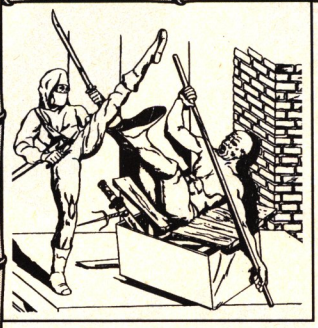

KYUM-GAI TO BE NINJA

OS-9

Kyum-Gai: to be Ninja (OS-9 Version) is the culmination of a project started almost a year ago. The talents of *Glen R. Dahlgren* (RS-DOS game writer for Sundog Systems), *Kevin Darling* (a legend for his work in OS-9), and *Eddie Kuns* (author of KBCom) have been pooled to create a masterpiece of game software under the OS-9 operating system. Fast martial arts action with outstanding graphics, great digitized sound effects, and incredible animation are featured in this arcade game, all in the OS-9 environment.

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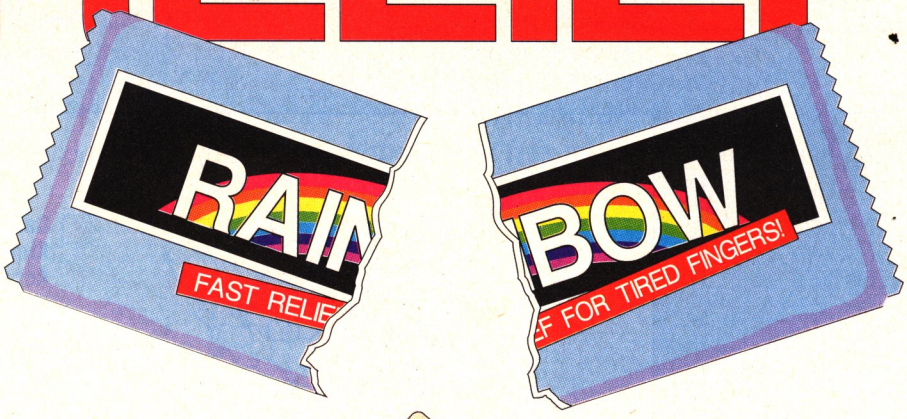

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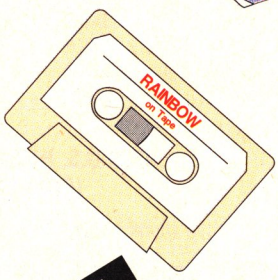

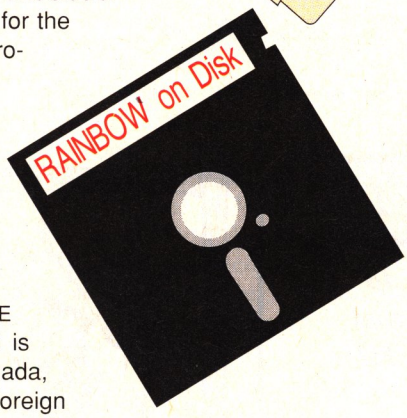

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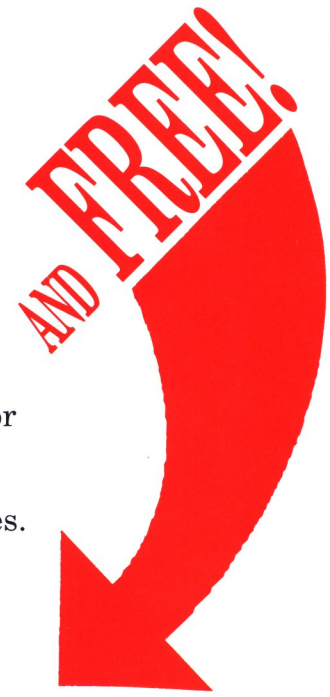

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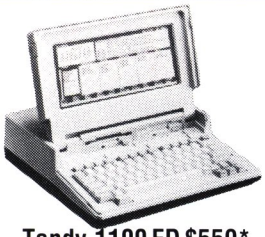

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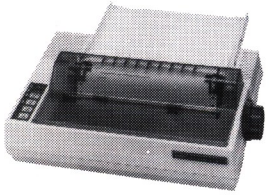

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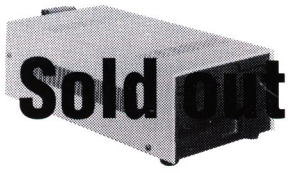

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